TELEPHONE ENGINEER

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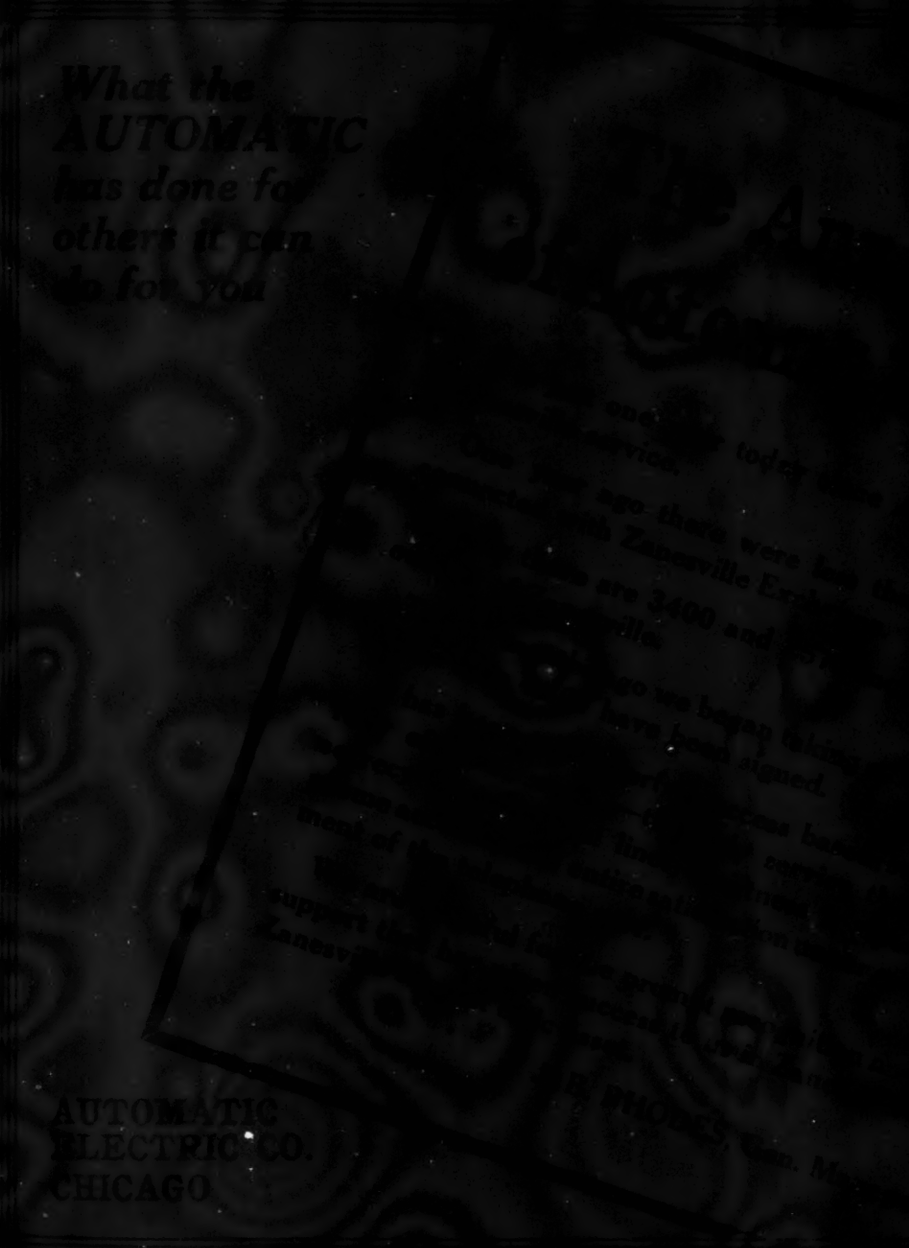

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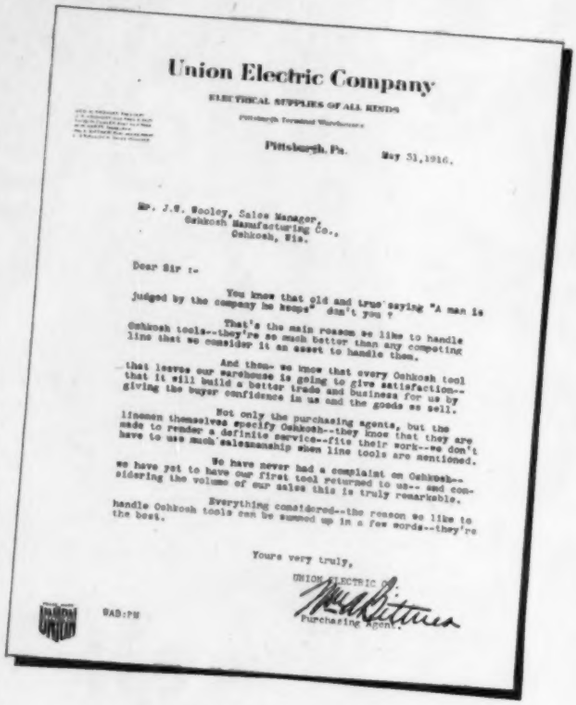

Union Electric Company

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Pittsburgh, Pa. May 31,1916.

Mr. J.W. Wooley, Sales Manager,
Oshkosh Manufacturing Co.,
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Not only the purchasing agents, but the linemen themselves specify Oshkosh--they know that they are made to render a definite service--fits their work--so don't have to use much salesmanship when line tools are mentioned.

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Yours very truly,

UNION ELECTRIC CO.

WAD:PH

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This is only a sample taken from hundreds of such letters. There is a dealer of Oshkosh construction tools in your neighborhood.

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VOL. XVI CHICAGO, AUGUST, 1916 NO. 2

Carrying Insurance on Independence

ANY Independent operator who sells out to the Bell interests is as apt as not to be a member of the Independent association, and the larger the association grows the greater is the likelihood of its including all the renegade Independents. Being a member, and possibly a live and active member, the deserter may even be a director or an officer of the association. As mergers of Independent with Bell companies continue with startling frequency, the situation seems rather embarrassing and a little discouraging to those who are endeavoring to make Independent telephony stronger, and not weaker.

As has been observed before, it is impossible to prevent the sale of an Independent property to a Bell company by moral suasion, and so far the legal side of the problem has been as a broken staff. The men who are determined to sell and to buy each other's property are generally clever enough to find some way to evade a half-hearted law if only through a technicality. One might, indeed, conjecture that the existence of such a law or agreement was in itself a temptation to break it, judging from the increased number of mergers which have taken place during the last two years, and which are even now being negotiated in greater profusion than ever.

Because of the direct bearing such mergers have upon the Independent association, through the secession of various of its members and their influence upon their fellows, it is interesting to speculate upon the possibility of protecting the association against its deserters. Probably there is nothing practical even in the thought; but there are one or two more or less Utopian ways that suggest themselves by which the directors, at least, of the association might carry the responsibilities of their position to the advantage of the association.

Directors of such an association as that of the Independent telephone industry have an important place in commercial society. It is because their influence is believed to be strong that they are elected to the office. The perversion of that influence by the commission of anti-Independent acts is destructive to the principles they are elected to support and foster. When the leaders fall and profit by their falling, virtue is made doubly hard for those in the ranks.

All of this smacks of morality, and therefore (ashamed though we be of the cynicism) has little weight. The medicine for the disease, to be effective, must act not upon the conscience but upon the pocket.

Any means of actually preventing mergers must be external to the association, by the enforcement of present laws or the enactment of new legislation if it be necessary. Work along that line is being done, of course, and no new or improved method suggests itself. The process is very slow, and so far its results seem to be negative.

But if the association cannot prevent the sale of its member companies to the Bell, why not try to make some of them, at least, profitable to it, and beneficial to the members who remain Independent? Plain, ordinary members who desert the ranks are probably out of reach; but the directors are not. Why not have each director of the association bonded to the extent of a thousand dollars or so, the bond to be forfeited to the treasurer on the sale

of the director's company to the Bell? Or make it ten thousand, for that matter; we might as well have something worth while if we are going to speculate about it.

The prospect of forfeiting a good sum of money, as we said before, would not stop a merger. No doubt the Bell company interested in the proposition would readily undertake to finance the forfeit, thus relieving the situation so far as the association director was concerned. But in any event, no matter who paid, the association's treasury would be that much wealthier. Every time a director sold out the association would be in funds for a new attack on the big problem. After the Bell had enjoyed a particularly active period of absorption, the association could almost declare a dividend.

The suggestion has a number of advantages which become evident the more we study it. Financing a trade association is always hard work; but this way the problem is solved. The more directors go out, the more money comes in. The only hardship would be the accidental election of a particularly virtuous board of directors, all of whom would refuse to sell out. That might cause hard times; so it would be unwise, in the enthusiasm for the new plan, to abandon the older and more conventional methods of financing.

One telephone man, to whom we painstaking and earnestly explained the scheme, irreverently suggested that the association impose a pro rata tax on its members, and form a pot. The last Independent, of course, would take the pot. Thus, he said, we would always be assured of an Independent association with at least two members. Our objection to this fantastic arrangement is that the Bell interests would buy the pot.

Seriously, the directors of the association have a responsibility, and they should be made to carry it. Those who would object are not desirable as members of the board. And there are enough representative Independents who would not object, who would gladly make the association the beneficiary of insurance on their Independence, to form a first class board of directors.

For a Broader Engineering

AN editorial in a prominent electrical trade paper advises that engineers confine their efforts in valuation work to appraisal of tangible values, that is to physical property, and leave to others the determination of intangible values. It is emphasized that the work of the engineer is primarily with the materials of the earth and with the transformations of energy brought about through the use of these materials; with matters of fact and the behavior of matter and energy. Therefore, it is stated he is most competent to handle the inventory of engineering structures and systems, but not to express an opinion on values in a commercial sense.

This view of the engineer's function is in accord with practice and tradition. It is a more scientific attitude than that popular idea that associates an engineer with the running of an engine; but it is more complimentary to engineering brains only in degree. It still assumes that the human mind must be classified in two divisions, one of which includes all engineers to their exclusion from the other.

The young engineer who follows the traditional trail of his calling usually settles down to a habit of mind that doubtless deserves the restriction advocated by our contemporary. It is, indeed, the fault of the engineering body that the well known "rut" is so prominent a factor in the profession.

Engineering education puts no shackles on mental activity, nor does the practice of engineering prevent the exercise of those qualities found useful by lawyers and business men. Rather does the proper and sensible use of engineering brains and training conduce to a high degree of ability along all lines of mental activity. The engineer who has used his gifts wisely is as competent to determine or estimate intangible values and commercial importances as any other man—and he should be more so.

We cannot deny that the engineer is prone to neglect the commercial factors for the scientific; but he does it because his passion for technics leads him astray. Therefore the habit is a weakness, and the engineer who is in its clutches is a very imperfect engineer.

A somewhat facetious but very able dissertation on this peculiar engineering characteristic appeared recently in the Engineering Magazine under the rather unusual head-

ing, "Pink Pirate Pills for Engineers." The author cites one illuminating instance of a young engineer who, placed in responsible charge of a large work, was making astonishing progress and displaying an excellent commmercial sense, when suddenly he found himself confronted by a purely technical problem. Rushing into the breach, he spent three weeks in solving the difficulty, which saved his employers all of thirty-five dollars. He lost his job, a victim to his uncontrollable passion for stresses and strains and the other special toys of engineers.

There are too many engineers of that temperament. There are not enough who have learned that the brains that figure stresses and formulas are the cheapest commodity on the educated labor market.

The engineer who can tear himself away from the lingering embrace of his pet problems and view the world with a wide-angle vision can raise the whole standard of engineering. It is because of his unfortunate amour for details that he has achieved his reputation for incompetence in commercial fields.

Those Western Electric Salesmen

THE withdrawal of Western Electric salesmen from the Independent operating field seems to be largely a state of mind. Salesmen for Independent manufacturing companies report running into sales competition as severe as ever within a few days after the statement of withdrawal emanated from the Western Electric New York offices. It is evident either that the announcement was not sincere, or that the stringency announced as the reason for the renunciation was relieved almost as soon as it became evident.

The circumstance is apparently suspicious. Seemingly the Bell factory has been guilty of a breach of promise. It is accused of practicing subterfuge for the purpose of quieting opposition to its methods.

We have no desire to rush to the defense of Bell tactics, which are often entirely beyond our comprehension. But just as we warned the Independents last month against taking too seriously the implied promise of future immunity from Bell sales effort, we wish now to point out that there is nothing extraordinary in the resumption or continuation (whichever it may be) of such activity.

Whether or not the Western Electric Company notified its Independent customers and "prospects" through the mails that it could no longer solicit their business we do not know. We have heard no one mention receiving such notification. The announcement apparently first became public through a newspaper interview, the correctness of which was corroborated later by an officer of the company. It was not aimed directly, although it may have been indirectly, at the Independents. In it the company expressly reserved and announced the right to resume the operations it declared suspended whenever it should see fit. In all justice, then, the Western Electric Company can scarcely be accused of a breach of faith in the matter.

If the Independent field is unduly exercised over this seeming fiasco, responsibility for the harm done lies upon those who jumped to an erroneous conclusion in a hasty and illogical way, seeking in a mere coincidence to find capital for a propaganda that deserves more sensible treatment.

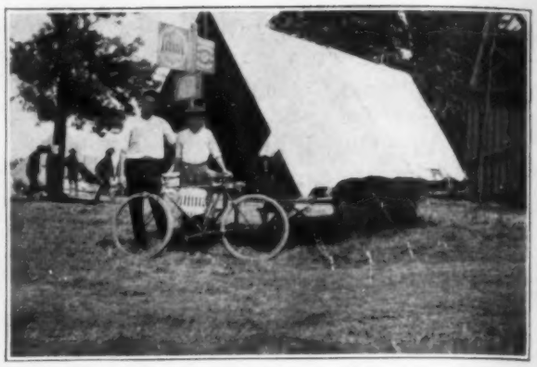
Whether the Western Electric Company is or is not resuming, or continuing, or ceasing its sales operations among Independent telephone men, its action has no significance whatever. It has no intention of quitting the Independent field for good unless it is forced to do so. It will never be forced by an enemy who shouts "Victory" when the firing stops for a few moments.

And then the Western Electric announcement may still be found to have something in it, in spite of Independent reports to the contrary. Since the reasons given were logical enough, we are bound to assume that they were not founded entirely upon air.

In expressing our conviction that there is no political or legal reason underlying the announcement, we feel constrained to express our own disappointment that there is not. Our firm belief that the Bell-owned factory should sell only to Bell-operated companies has been set forth here too often and too plainly to need repetition now.

But we must record facts as they are, and not as we might wish them to be.

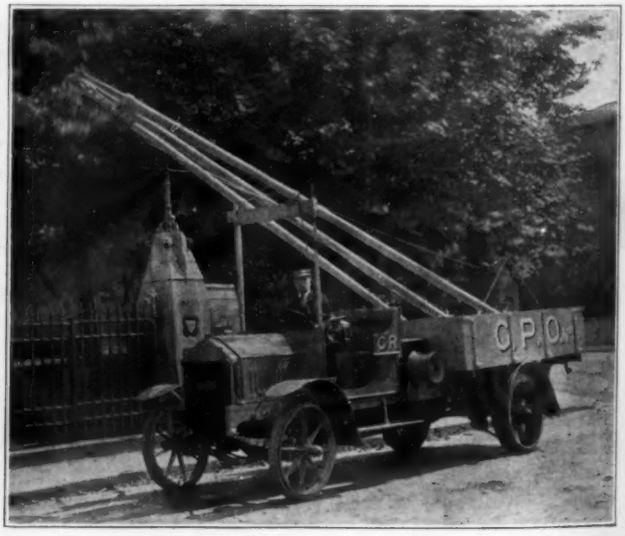
Telephone poles as raw material. This view of the Sandpoint (Idaho) Cedar and Lumber Company's source of stock makes one wish he were a lumberman.



This photograph was taken at Camp Clark, the mobilization camp of the Missouri National Guards at Nevada, Missouri. The toll station shown in photo is one of many stations located in the camp. A complete system was established in the camp and local and long distance service was given day and night. The service rendered by the Kinloch Long Distance Telephone Company and Kansas City Home Long Distance Telephone Company was complimented very much.. The business was very heavy and was handled very rapidly which made the Independent telephone lines very popular with the troops. Homer Gray, the toll attendant and King Grace, the messenger, are shown here in front of their station.

One of the conveniences of motor travel in Great Britain. A member of the Automobile Association and Motor Union whose car is in trouble halts at a roadside sentry box telephone and calls up a garage while the patrol helps with the car.

It takes big logs to make small cross arms. This photograph shows one of the giant firs the American Cross Arm Company uses. Of course only the best of stock can be used.



One of the specially equipped L'Acoe motor trucks in the service of the Telephone and Telegraph Department, London, England, General Post Office.

STORIES IN PICTURES OF TELEPHONE PRACTICE AND PROGRESS IN ALL PARTS OF THE WORLD.

The Transmitter in Transmission Problems

A Simple Theory of the Carbon Granule Microphone with Some Experimental Data

BY H. S. SHEPPARD

THE telephone transmitter is the dynamo of the telephone system.

Its function is to convert the vibrations of sound into electric currents, and on the successful performance of this function speech transmission very largely depends. Despite its importance the transmitter has been neglected in the technical press of recent years, due perhaps to the great perfection of the modern instrument and the feeling that there is no more to be done toward its development. The difficulty and uncertainty of securing experimental results in measurements involving granular carbon has also discouraged independent investigators from doing work along this line.

The aim of this article is to discuss a very elementary theory which it is hoped will assist to a better understanding of the quantitative behavior of the ordinary transmitter.

First let us consider what a transmitter is. The modern instrument is a granular carbon microphone which may be thought of as a rheostat constantly changing its resistance, and consequently changing the current flowing in its circuit, in unison with the sound vibrations imposed on the diaphram.

A skeleton diagram of the transmitter is shown in Fig. 1. The essentials are—a diaphram d to receive the sound vibrations, two polished carbon discs e and e' to

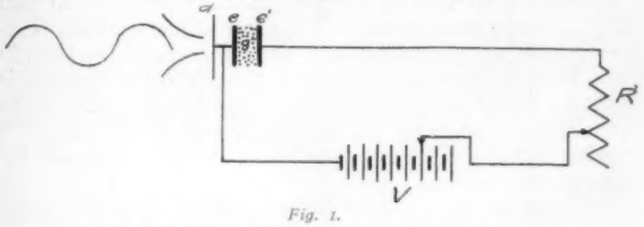


Fig. 1.

serve as electrodes, and the granular carbon mass g which forms the variable resistance element. The microphonic action is caused by the change in resistance of the granular carbon mass under the varying pressure of the diaphram. The following reasons have been advanced by various writers for this resistance change:

a. That there is an actual change in the resistance of the carbon when subjected to pressure.

b. That each granule is separated from each other granule by a small film of air; that this air is ionized and therefore a conductor and the change in pressure causes the length of path through this ionized air to vary, consequently changing the resistance of the carbon button.

c. That the heating effects at the points of contact aid microphonic action in some way, perhaps by the formation of small arcs and the variation in the length and number of these arcs.

d. That the area of contact between elastic bodies such as polished carbon granules varies with the pressure, or that with rough granules the number of points of contact varies. In either case the effective current carrying cross-section of the carbon cell is increased and the resistance reduced.

The law of the variation of resistance for granular carbon with pressure and current is not a simple one and there are many sudden and peculiar changes in the transmitter resistance, even when the diaphram is not vibrating. Notwithstanding this uncertainty we may without great error build up a theory on one of two assumptions:

a. The transmitter resistance follows a harmonic law, and

b. The variation in current follows a harmonic law.

By a harmonic law we mean that these quantities follow a sine wave, which is the simplest and most common form of periodic vibration.

Let us consider a transmitter of the type described in the foregoing paragraphs acting in a circuit containing resistance only. An approximation to this case would be a common battery loop in which the resistance is high in comparison with the capacity and inductance. Fig. 1 shows such a circuit. Consider that a tuning fork in front of the transmitter produces a pure sound at a frequency of say 512 vibrations per second. Now the resistance of the transmitter, according to the assumption made under (a), will pulsate harmonically in unison with the tuning fork vibrations and there will be ripples set up on the direct current flowing. We may consider in order to get a better idea of what happens in the circuit, that an alterntaing current has been superimposed on the direct current which we had when the transmitter was at rest.

To find the alternating component of this current, which is the part effective for speech transmission, we may proceed as follows:

Let C = Normal resistance.
r = Maximum change in transmitter resistance from normal.
R = Resistance of the circuit external to transmitter.
V = Voltage of the battery.
c = Instantaneous resistance of the circuit at time t.
i = Instantaneous current in the circuit at time t.
t = Time, computed from some fixed point.

Remembering our sine law variation in resistance we can then write the equation:

$$c = R + C + r \sin \omega t \qquad (1)$$

Where ω is the angular velocity or $2\pi\times$ the frequency of the tuning fork and t is the time computed from some fixed point, then

$$i = \frac{V}{c} = \frac{V}{R + C + r \sin \omega t} \qquad (2)$$

This equation shows that the current is not sinusoidal. It might be developed into a long mathematical series, but we can determine the total variation in current more simply by considering maximum and minimum values only. We shall have maximum values of i when $\sin wt = -1$ and minimum values when $\sin wt = +1$, the sines then conveniently dropping out. Inserting these values in equation 1 we have,

$$c\text{max} = R + C + r$$
$$c\text{min} = R + C - r.$$

If $r = 3$ ohms, $C = 30$ ohms and $R = 50$ ohms then $c\text{max} = 83$ ohms and $c\text{min} = 77$ ohms. For the current

$i\text{max} = V/R + C - r = 10/77 = .13$ amperes
$i\text{min} = V/R + C + r = 10/83 = .1205$ amperes
$i\text{normal} = V/R + C = 10/80 = .125$ amperes

Let us now represent what happens in the circuit by means of a current diagram as in Fig. 2. The ordinates or distances from the curve to the base line represent the current values at any time t. Computing the distances a and b as shown on the curve we find that

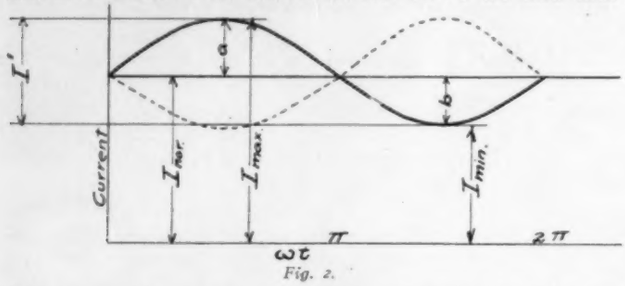


Fig. 2.

the current increases above normal more than it decreases below, a being .05 while b is .0450 so that the curve is not symmetrical with respect to the axis of normal current.

The dotted curve in Fig. 2 shows the variation in resistance with time and its phase displacement, as indicated by equation (2), is half of a period or 180 time degrees.

The total variation of current in the circuit from maximum to minimum is $a + b$ and this quantity may be represented by I' as shown. To get an expression for I' in terms of the constants of the circuit set $I' = I$ max $-$ Imin.

Substituting values for $i$max and $i$min,

$$I' = V/R + C - r - V/R + C + r$$
$$= VR + VC + Vr - VR - VC + Vr$$
$$(R + C - r)\ (R + C \pm r)$$

Remembering that the product of the sum and difference of two quantities is equal to the difference of their squares we can write

$$I' = 2Vr/(R + C)^2 - r^2$$

Now r is a small quantity as compared with $(R + C)$ which represents the total normal resistance of the circuit and we may neglect r^2 without very great error unless R, the resistance external to the transmitter is small. This gives us as the expression representing the alternating component of the current in the circuit,

$$I' = 2Vr/(R + C)^2$$

This quantity does not depend on the frequency as no inductance or capacity is considered to be present in the circuit.

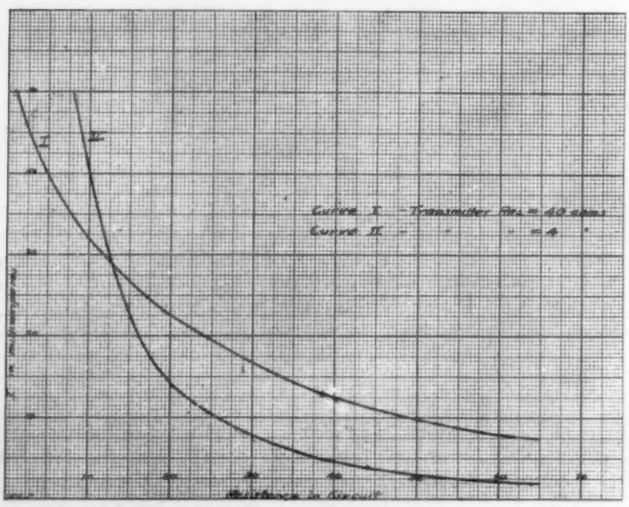


Fig. 3.

For the numerical case taken, $I' = 2 \times 10 \times 3/80^2 = 60/6400 = .094$ while $i$max $-$ $i$min $= .095$, the difference being due to the fact that r^2 was dropped.

It is evident that in a circuit of the kind studied the speech transmission efficiency will depend directly on the amount of current variation produced by the transmitter or on I', so that by studying this expression we may determine in just what way each factor affects transmission.

First, let us see what is the best transmitter resistance for a loop or circuit of a given resistance? Curves are plotted in Fig. 3 showing the relation between I' and R for two transmitter resistances. It is seen from this that the low resistance transmitter is best on loops of low resistance while on high resistance loops the high resistance transmitter shows the greatest I'. To arrive at a relation mathematically between C and R let us differentiate the expression for I' with respect to C and solve to find the condition for maximum I'. The quantity r depends on C and we may consider it to be always a certain definite per cent p of C, then $pC = r$. Making this substitution we have $I' = 2VpC/(R + C)^2$ and for I' to be a maximum

$$dI'/dC = \frac{2Vp(R^2 + 2RC + C^2) - 2VpC(2R + 2C)}{(\text{denominator})^2} = 0$$

Then $R^2 = C^2$ or $R = C$.

For best transmission then the resistance of the transmitter should be equal to the loop resistance. If r^2 is not neglected then

$$C = R//1 - p^2$$

This condition is approximated in practice, in that higher resistance transmitters are used in common battery working where the loop resistance is large, than in the local battery circuit where the circuit resistance is small. There are many other factors, however, such as mechanical construction, distortion, and battery renewals which influence the transmitter resistance selected for any given case.

Next let us consider battery supply loss. This loss is that due to the sub-station loop resistance causing a decrease in the amount of direct current flowing through the transmitter and in consequence reducing its efficiency. We may factor our expression for I' as follows:

$$I' = V/(R + C) \times 1/(R + C) \times 2r$$

The first factor represents the direct current flowing, this being directly proportional to the voltage and inversely proportional to the resistance of the circuit. We can decrease battery supply loss, then, either by raising the direct current voltage or cutting down the loop resistance. This loss occurs in transmitting loops only.

The second factor represents what we may call the alternating-current or high-frequency loss and it is the reciprocal of the resistance of the circuit. This loss occurs in both sending and receiving loops, depending, of course on the inductance and capacity of the circuit as well as on its resistance.

The third factor depends on the transmitter and is a measure of its power to produce oscillations in any circuit.

While we may decrease the battery supply loss by increasing the voltage, this will not affect the high frequency loss. Of two circuits, then, in which the direct current is exactly the same, the one having a low voltage and low resistance will have a smaller total loss than the one having the higher resistance and the correspondingly higher voltage. In order to compensate for

increase in resistance the voltage must be increased as the square of the ratio of increase. This shows the importance of keeping down the resistance of the subscribers loops in a common battery system.

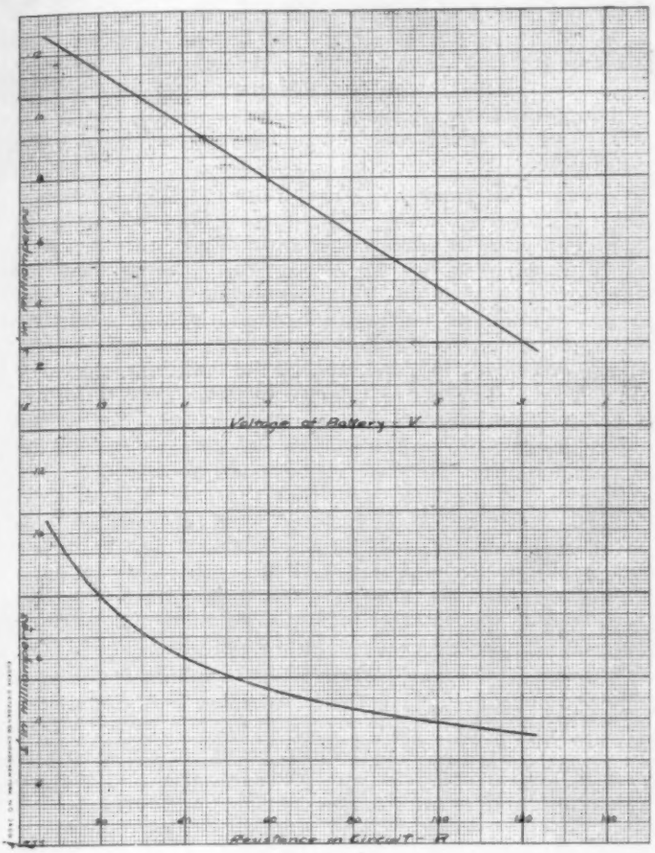


Fig. 4.

Fig. 4 shows some curves obtained with the help of an oscillograph. Values of I' were measured in such a circuit as Fig. 1 under two conditions,

a. Voltage varied, resistance constant.
b. Voltage constant, resistance varied.

In case (a) the equation of the curve should be $I' = KV$ where K is a constant equal to $2r/(R + C)$. This is the equation of a straight line and the experimental curve indicates that the theory is correct. The slope of this line is $K = 2r/(R + C)$ so that if R and C are known the value of r can be easily taken from the curve sheet.

In case (b) the equation should be $I' = K'/(C + R)^2$ where K' is a constant equal to $2rV$ and C is also a constant. This is a third degree curve and the experimental curve is seen to be a curve of this kind.

The importance of having a large value of r for the transmitter is seen in the fact that I' varies directly as this quantity r depends on the construction as well as on the resistance of the transmitter. It also depends, of course, on the frequency, on the natural period of the transmitter diaphram, and on the direct current and consequent heating of the transmitter button. In a packed transmitter r would be very small.

Indiana Commission Fixes Short Time Rates

In a list of orders handed down by the Public Service Commission of Indiana, rules governing short-time service for the Central Union Telephone Company in Indianapolis were promulgated. The rules provide that where service of three months or less is provided, 40 per cent of the year's rental shall be charged. Where six months' service is required, 65 per cent shall be charged, and for nine months' service 80 per cent of the annual rental shall be charged. The rules provide that for all in excess of nine months' service the full annual rental shall be charged.

Nebraska and Kearney Companies Merged

After four years of parley and delay the consolidation of the Nebraska Telephone Company and the Kearney Telephone Company took effect July 1. The sale conveys all the property of the Nebraska Company over to the Kearney Telephone Company in Kearney. The long-distance rights are still in the possession of the Bell system under the new arrangement.

To effect the sale and consolidation of the telephone company has been a long and tedious task. Four years ago the Nebraska state legislature passed a bill making possible the sale of one telephone company to another, providing the sale had the sanction of the state railway commission and the attorney-general of the United States. Under this action the Bell companies obtained control of the telephone situation in the state. The Nebraska Telephone Company took possession of the business north of the Platte and the Lincoln Telephone Company, a branch of the main division, took control of all telephones south of the Platte.

One year ago a resolution was placed before the railway commission asking that the two Kearney companies be consolidated. The commission ratified the action and ordered that the Bell company take over the interests of the Kearney concern.

The attorney-general at Washington refused permission to buy the Independent exchange in respect to an agreement with the American Telephone and Telegraph Company. This action further delayed the consolidation until a suit was instigated by E. D. Gould and W. J. Scoutt of Kearney. The suit called for the forcible sale of the Bell properties to the Kearney concern. To this procedure the Bell people strongly objected, stating that they could not surrender their holdings in Kearney.

After much persuasion and debating the detail of transfer was finally decided upon by the Bell Company and the details were worked out to the satisfaction of both companies after months of effort.

For the transfer a complete inventory of both plants was necessary. Many improvements are contemplated under the new order. Three new switchboard sections will be installed in the Bell office which will be used for the new exchange. Only the shortage of materials will postpone these new additions taking place at once. Fifteen thousand feet of new cable will be installed and practically all of the open lines of the Kearney company will be torn up. The plant will be put in first-class shape and service of the metropolitan variety placed at the service of Kearney and the surrounding territory.

The improvements contemplated, in round numbers, will approximate $40,000.

W. W. Johnson, the present manager of the Bell company, will be in charge as local manager of the new consolidated organization and resigned his position July 1 to take up duties which give him control of the combined telephone business of Kearney and its connections.

The Telephone Art

Address Before the Franklin Institute upon Receipt of Franklin Medal

BY JOHN J. CARTY

MORE than any other, the telephone art is a product of American institutions and reflects the genius of our people. The story of its wonderful development is a story of our own country. It is a story exclusively of American enterprise and American progress, for, although the most powerful governments of Europe have devoted their energies to the development and operation of telephone systems, great contributions to the art have not been made by any of them. With very few exceptions, the best that is used in telephony everywhere in the world to-day has been contributed by workers here in America.

It is of peculiar interest to recall the fact that the first words ever transmitted by the electric telephone were spoken in a building at Boston, not far from where Benjamin Franklin first saw the light. The telephone, as well as Franklin, was born at Boston, and, like Franklin, its first journey into the world brought it to Philadelphia, where it was exhibited by its inventor, Alexander Graham Bell, at the Centennial Exposition in 1876, held here to commemorate the first hundred years of our existence as a free and independent nation.

It was a fitting contribution to American progress, representing the highest product of American inventive genius, and a worthy continuance of the labors of Franklin, one of the founders of the science of electricity as well as of the Republic.

Nothing could appeal more to the genius of Franklin than the telephone, for not only have his countrymen built upon it an electrical system of communication of transcendent magnitude and usefulness, but they have made it into a powerful agency for the advancement of civilization, eliminating barriers to speech, binding together our people into one nation, and now reaching out to the uttermost limits of the earth, with the grand aim of some day bringing together the people of all the nations of the earth into one common brotherhood.

On the tenth day of March, 1876, the telephone art was born, when, over a wire extending between two rooms on the top floor of a building in Boston, Alexander Graham Bell spoke to his associate, Thomas A. Watson, saying: "Mr. Watson, please come here; I want you." These words then heard by Mr. Watson in the instrument at his ear constitute the first sentence ever received by the electric telephone. The instrument into which Mr. Bell spoke was a crude apparatus, and the current which it generated was so feeble that, although the line was about a hundred feet in length, the voice heard in the receiver was so faint as to be audible only to such a trained and sensitive ear as that of the young Mr. Watson, and then only when all surrounding noises were excluded.

Following the instructions given by Dr. Bell, Mr. Watson with his own hands had constructed the first telephone instruments and ran the first telephone wire. At that time all the knowledge of the telephone art was possessed exclusively by these two men. There was no experience to guide and no tradition to follow. The founders of the telephone, with remarkable foresight, recognized that success depended upon the highest scientific knowledge and technical skill, and at once organized an experimental and research department. They also sought the aid of university professors eminent for their scientific attainments, although at that time there was no university giving the degree of electrical engineer or teaching electrical engineering.

From this small beginning there has been developed the present engineering, experimental, and research department which is under my charge. From only two men in 1876, this staff has, in 1915, grown to more than 600 engineers and scientists, including former professors, postgraduate students, and scientific investigators, graduates of nearly a hundred American colleges and universities, thus emphasizing in a special way the American character of the art. The above number includes only those devoted to experimental and research work and enigneering development and standardization, and does not include the very much larger body of engineers engaged in manufacturing and in practical field work throughout the United States. Not even the largest and most powerful government telephone and telegraph administration of Europe has a staff to be compared with this. It is in our great universities that anything like it is to be found, but even here we find that it exceeds in number the entire teaching staff of even our largest technical institutions.

A good idea may spring up in the mind of man anywhere, but as applied to such a complex entity as a telephone system, the countless parts of which cover a continent, no individual unaided can bring the idea to a successful conclusion. A comprehensive and effective engineering and scientific and development organization such as this is necessary, and years of expensive work are required before the idea can be rendered useful to the public.

But, vital as they are to its success, the telephone art requires more than engineers and scientists. So we find that in the building and operation and maintenance of that vast continental telephone system which bears the name of Bell, in honor of the great inventor, there are at work each day more than 170,000 employees, of which nearly 20,000 are engaged in the manufacture of telephones, switchboards, cables, and all of the thousands and tens of thousands of parts required for the operation of the telephone system of Amreica.

The remaining 150,000 are distributed throughout all of the states of the Union. About 80,000 of these are women, largely telephone operators; 50,000 are linemen, installers, cable splicers, and the like, engaged in the building and maintaining of the continental plant. There are thousands of other employees in the accounting, legal, commercial, and other departments. There are 2100 engineers located in different parts of the country. The majority of these engineers have received technical training in American technical schools, colleges, and universities. This number does not include, by any means, all of those in the other departments who have received technical or college training.

In view of the technical and scientific nature of the telephone art, an unusually high-grade personnel is required in all departments, and the amount of unskilled labor employed is relatively very small. No other art calls forth in a higher degree those qualities of initiative,

judgment, skill, enterprise, and high character which have in all times distinguished the great achievements of America.

In 1876 the telephone plant of the whole world could be carried away in the arms of one man. It consisted of two crude telephones like the one now before you, connected together by a wire of about one hundred feet in length. A piece cut from this wire by Mr. Watson himself is here in this little glass case.

At this time there was no practical telephone transmitter, no hard-drawn copper wire, no transposed and balanced metallic circuit, no multiple telephone switchboard, or telephone switchboard of any kind, no telephone cable that would work satisfactorily; in fact, there were none of the multitude of parts which now constitute the telephone system.

The first practical telephone line was a copy of the best telegraph line of the day. A line wire was strung on the poles and housetops, using the ground for the return circuit. Electrical disturbances, coming from no one knows where, were picked up by this line. Frequently the disturbances were so loud in the telephone as to destroy conversation. When a second telephone line was strung alongside the first, even though perfectly insulated, another surprise awaited the telephone pioneer. Conversation carried on over one of these wires could plainly be heard on the other. Another strange thing was discovered. Iron wire was not as good a conductor for the telephone current as it was for the telegraph current. The talking distance, therefore, was limited by the imperfect carrying power of the conductor and by the confusing effect of all sorts of disturbing currents from the atmosphere and from neighboring telephone and telegraph wires.

These and a multitude of other difficulties, constituting problems of the most intricate nature, impeded the progress of the telephone art, but American engineers, by persistent study, incessant experimentation, and the expenditure of immense sums of money have overcome these difficulties. They have created a new art, inventing, developing and perfecting, making improvements great and small in telephone, transmitter, line, cable, switchboard, and every other piece of apparatus and plant required for the transmission of speech.

As the result of nearly forty years of this unceasing, organized effort, on the 25th of January, 1915, there was dedicated to the service of the American public a transcontinental telephone line, 3600 miles long, joining the Atlantic and the Pacific, and carrying the human voice instantly and distinctly between San Francisco and New York and Philadelphia and Boston. On that day over this line Dr. Bell again talked to Mr. Watson, who was now 3400 miles away. It was a day of romantic triumph for these two men and for their associates and their thousands of successors who have built up the great American telephone art.

The 11th day of February following was another day of triumph for the telephone art as a product of American institutions, for, in the presence of dignitaries of the city and state here at Philadelphia and at San Francisco, the sound of the Liberty Bell, which had not been heard since it tolled for the death of Chief Justice Marshall, was transmitted by telephone over the transcontinental line to San Francisco, where it was plainly heard by all those there assembled. Immediately after this the stirring tones of "The Star-Spangled Banner," played on the bugle at San Francisco, were sent like lightning back across the continent to salute the old bell in Philadelphia.

It had often been pointed out that the words of the tenth verse of the twenty-fifth chapter of Leviticus, added when the bell was recast in 1753, were peculiarly applicable to the part played by the old bell in 1776. But the words were still more prophetic. The old bell had been silent for nearly eighty years and it was thought forever, but by the use of the telephone a gentle tap, which could be heard through the air only a few feet away, was enough to transmit the tones of the historic relic all the way across the continent from the Atlantic to the Pacific. Thus by the aid of the telephone art, the Liberty Bell was enabled literally to fulfill its destiny and "Proclaim liberty throughout all the land, unto all the inhabitants thereof."

The two telephone instruments of 1876 had become many millions by 1916, and the first telephone line, a hundred feet long, had grown to one of more than three thousand miles in length. This line is but part of the American telephone system of twenty-one million miles of wire, connecting more than nine million telephone stations located everywhere throughout the United States, and giving telephone service to one hundred million people. Universal telephone service throughout the length and breadth of our land, that grand objective of Theodore N. Vail, has been attained.

While Alexander Graham Bell was the first to transmit the tones of the human voice over a wire by electricity, he was also the first to transmit the tones of the human voice by the wireless telephone, for, in 1880, he spoke along a beam of light to a point a considerable distance away. While the method then used is different from that now in vogue, the medium employed for the transmission is the same—the ether, that mysterious, invisible, imponderable wave conductor which permeates all creation.

While many great advances in the wireless art were made by Marconi and many other scientists in America and elsewhere, it remained for that distinguished group of American scientists and engineers, working under my charge, to be the first to transmit the tones of the human voice in the form of intelligible speech across the Atlantic ocean. This great event and those immediately preceding it are so fresh in the public mind that I will make but a brief reference to them here.

On April 4, 1915, we were successful in transmitting speech without the use of wires from our radio station at Montauk Point, on Long Island, to Wilmington, Delaware.

On May 18 we talked by radio telephone from our station on Long Island to St. Simon Island, in the Atlantic Ocean, off the coast of Georgia.

On the 27th of August, with our apparatus installed by permission of the Navy Department at the Arlington, Virginia, radio station, speech was successfully transmitted from that station to the navy wireless station equipped with our receiving apparatus at the Isthmus of Panama.

On September 29 speech was successfully transmitted by wire from New York City to the radio station at Arlington, Virginia, and thence by wireless telephone across the continent to the radio station at Mare Island Navy Yard, California, where I heard and understood the words of Mr. Theodore N. Vail speaking to me from the telephone on his desk at New York.

On the next morning at about one o'clock, Washington time, we established wireless telephone communication between Arlington, Virginia, and Pearl Harbor, in the Hawaiian Islands, where an engineer of our staff, together with the United States naval officers, distinctly heard words spoken into the telpehone at Arlington, Virginia. On October 22, from the Arlington tower in Virginia, we successfully transmitted speech across the Atlantic ocean to the Eiffel Tower at Paris, where two of

our engineers, in company with French military officers, heard and understood the words spoken at Arlington.

On the same day when speech was being transmitted by the apparatus at Arlington to our engineers and to the French military officers at the Eiffel Tower in Paris our telephone engineer at Pearl Harbor, Hawaii, together with an officer of the United States navy, heard the words spoken from Arlington to Paris and recognized the voice of the speaker.

As a result of exhaustive researches too extensive to describe here, it has been ascertained that the function of the wireless telephone is not to do away with the use of wires, but rather to be employed in situations where wires are not available or practicable, such as between ship and ship, and ship and shore, and across large bodies of water. The ether is a universal conductor for wireless telephone and telegraph impulses and must be used in common by all who wish to employ those agencies of communication. In the case of the wireless telegraph the number of messages which may be sent simultaneously is much restricted. In the case of the wireless telephone, owing to the thousands of separate wave-lengths required for the transmission of speech, the number of telephone conversations which may be carried on at the same time is still further restricted, and is so small that all who can employ wires will find it necessary to do so, leaving the ether available for those who have no other means of communication. This quality of the ether which thus restricts its use is really a characteristic of the greatest value to mankind, for it forms a universal party line, so to speak, connecting together all creation, so that anybody, anywhere, who connects with it in the proper manner, may be heard by every one else so connected. Thus a sinking ship or a human being anywhere can send forth a cry for help which may be heard and answered.

No one can tell how far away are the limits of the telephone art. I am certain that they are not to be found here upon the earth, for I firmly believe in the fulfilment of that prophetic aspiration expressed by Theodore N. Vail, at a great gathering in Washington, that some day we will build up a world telephone system, making necessary to all peoples the use of a common language or a common understanding of languages which will join all of the people of the earth into one brotherhood. I believe that the time will come when the historic bell which now rests in Independence Hall will again be sounded, and that by means of the telephone art, which to-day has received such distinguished recognition at your hands, it will proclaim liberty once more, but this time throughout the whole world, unto all the inhabitants thereof. And, when this world is ready for the message, I believe the telephone art will provide the means for transmitting to all mankind a great voice saying, "Peace on earth, good-will toward men."

The Buffalo Situation

In Buffalo, N. Y., the agitation for a one-telephone system has reached the point of two public hearings before the City Council.

Judge Daniel J. Kenefick, of counsel for the Federal Telephone and Telegraph Company, has advanced as an argument in favor of a merger the statement that competition in Buffalo is doomed through the pending failure of the Independent. If the company is not merged with the New York Telephone Company, he says, it is likely that a trustee for the bondholders will bring a foreclosure proceeding.

Outlining the history of the Federal company, Judge Kenefick says that for the first time since its organization in 1901 it defaulted on July 1 in the payment of interest on its bonds. He declares that the company desires a merger because there is no profit in competition, and that it is on the verge of financial death, because of lack of public support. He speaks of the installation of the automatic system at a cost of $1,000,000 in the attempt to stop the loss of telephone subscribers.

"In spite of this," Judge Kenefick is quoted as saying, "the loss continued. The men behind the Federal company, those who have poured money into it, have made an honest effort to sustain competition, but the public in Buffalo refused to support it. It is not our fault that we are here, but because of the changed attitude of the local subscribers. Having reached a point where we could no longer support the company, because of this lack of subscribers, we are compelled to negotiate a contract with the New York company or face a foreclosure."

The Federal Telephone Company has a controlling interest in the Rochester Telephone Company.

Opposition to the merger seems to have come chiefly from advocates of municipal ownership. Frank C. Perkins, of Buffalo, urged the City Council to take over the Federal Telephone Company and establish a municipal system in the event of a telephone monopoly. He declared that the Chamber of Commerce, the banks, department stores, newspapers, all of which are in favor of the merger, were swayed by influences not in sympathy with the general public.

Two-thirds of the telephone subscribers in Buffalo have been canvassed and 80 per cent of that number have signed the petition in favor of a single system, according to a recent statement issued by C. A. Spaulding, division commercial manager of the New York Telephone Company. At least one large concern, however, has declared it was wrongly quoted in this respect.

"It is interesting to note," Mr. Spaulding says, "that every bank has signed the petition favoring a single system; every daily newspaper, every department store and every first-class hotel has gone on record in favor of the system. The signatures are from all classes of subscribers, equally divided between business and residence users. Both large and small users have come out strongly in favor of the merger.

"Judging from results thus far, it is safe to assume that the sentiment of the telephone subscribers of Buffalo is overwhelmingly in favor of one complete telephone system, which will provide intercommunication between all telephone users, with access to toll lines now operated by both the Federal and the New York companies.

"Full publicity has been given to the fact that the New York company would under no circumstances consider the consolidation of the telephone systems unless a preponderance of the telephone-using public was thoroughly in favor of such consolidation. Results so far indicate that the plan to merge Buffalo's telephone system has the hearty support of a great majority of the subscribers.

"The pay-for-what-you-use principle of the message rate plan for business service, upon which the merger is contained, appeals to fair-minded business men. Residence subscribers are pleased with the prospect of a unified system offering wider scope of service at practically no change in rates."

Congressional Committee to Investigate

Senate Resolution No. 60 Promises Some Interesting Developments

BY F. B. MACKINNON

ON Saturday, July 15, the House of Representatives passed Senate Joint Resolution Number 60. This resolution thus having passed both houses of Congress, will go into effect when several minor changes made by the House have been agreed to by the Senate. This agreement undoubtedly will be reached within the next few days.

The resolution provides for a joint committee of five senators and five representatives who are to conduct an inquiry as to needed amendments to the Interstate Commerce Commission Act, to make an investigation of the problems of the common carriers and report recommendations looking to the solution of these problems; and to investigate the subject of government ownership of railroad, telephone and telegraph companies and to report whether government ownership or commission control is the ultimate solution of the problem.

In its report recommending that the resolution be adopted by the House of Representatives the committe on Interstate Commerce said in part:

"Since the approval of the Act to regulate commerce in 1887 the system has had a gradual and irregular growth by various and sporadic amendments, some of them making decided if not radical changes in the original plans and policies and some of them adding new and important activities. So the entire law to regulate commerce now in force is not a uniform, compact, symmetrical structure, easily understood, but is an incoherent growth, sometimes inconsistent, in some parts hardly reconcilable, and, to say the least of it, the diversities and incongruities should be carefully considered and wherever possible unified and improved, to the end that federal regulation of carriers may be successfully carried on with the best possible service to the public.

"The improvement of the telephone and telegraph, both wire and wireless, and the operations of the express companies and the connection of our local transportation system with foreign traffic, all having grown up or undergone changes in recent times, are worthy of study and demand in the interests of the public service thorough consideration."

After the resolution goes into effect and before the adjournment of the present session of Congress it is likely that the joint committee provided for will meet to organize. In view of political conditions it is not likely that any hearings will be held or work attempted until after the elections in November. It is probable that shortly after the elections the committee will begin its work, so as to be able to submit a preliminary report January 7, 1917, as required in the resolution.

In the opinion of some who are in close touch with congressional plans, the committee after making this preliminary report will be instructed to continue its investigations and be given sufficient funds with which to do so.

It is agreed by all parties that the act to regulate commerce needs revision and clarifying. Many suggestions have been made as to what changes are necessary and desirable. Among these are that the Interstate Commerce Commission should have the regulation of all issues of stocks and bonds of common carriers—full powers to control all relations between carriers, including compulsory physical connection, etc. Bills have been introduced into Congress looking to the amendment of the present act so as to give the commission these extended powers. The intent of Resolution 60 is to put into the hands of a committee of Congress the complete revision of the act to regulate commerce.

All telephone companies and the United States Independent Telephone Association as the representative of these companies are interested in the outcome of the committee's investigations. The questions of control of securities, physical connection of exchanges and toll lines, the division of tolls, uniform systems of accounts, manner of reporting, and the valuation of telephone properties—all these questions will be discussed and to what extent the commission shall control them will be decided. These investigations will be by public hearings. All interested parties will have opportunity to present their views. The association will naturally be expected to present the views and desires of the Independent telephone companies. During the next few months, then, the directors of the association will be called upon to outline the stand of Independent companies and to express those desires to the congressional committee.

In my opinion we are confronted with a concrete problem—the most serious that any Board of Directors of the Association has been called upon to solve in many years—the problem of how the telephone industry is to be controlled by the Federal Government. The plan that is adopted as the result of this investigation will be the plan followed for a long time to come. Congress is going to ask us "How can the telephone industry best be regulated for the good of the public?" In answering that question we must be prepared to outline a general definite plan of control covering the whole industry in all its details.

A committee was appointed at the last meeting of the Board of Directors to consider the whole telephone situation. Doubtless this committee will report to the Board of Directors suggestions looking to the solving of many of our problems. Their report and the board's action upon it will have to be made now in connection with the fact that the association will be expected to make similar recommendations to Congress.

When our committee reports to the board, therefore, should not the board be prepared to act definitely in agreeing upon the course of action to be pursued in connection with the Congressional investigation?

As soon as possible there will be presented a copy of Senate Resolution 60 as finally passed, and the matter should receive the earnest consideration of all Independent telephone men.

Interstate Commission Upholds Toll Charge

The Interstate Commerce Commission has ruled that the New York Telephone Company was justified in charging a higher rate for a long distance call than the aggregate of two local calls for the same distance. The commission declined to express an opinion on the right of the telephone company to withhold service from a subscriber who refused to pay the higher charge.

European Telephone Development

Translations from the Foreign Press and Communications from European Engineers

BY FRED W. SCHOLZ

THERE has been quite little improvement in European telephone equipment within the last five years. Of the countries in Europe, excepting England, which is usually classed separately, not being on the continent, Germany takes first place in point of view of equipment and modern installations. Next comes little Holland, where automatic telephony has made big strides, and then come France, Austria Hungary, the Scandinavian countries and the rest. If we compare European with American telephone equipment, we would find American equipment ahead in many respects. Nevertheless European systems show differences and some improvements that are worth while watching and, in some cases, even worth while imitating. The present article will take up the changes in installation in the common battery exchanges, mainly of Germany and Austria. As European countries, especially the Central Empires, have state ownership of telephone equipment, they are capable of a standardization of apparatus which is practically impossible in countries where there are a large number of independent telephone concerns. The older switchboards were known under the title C. B. '10 switchboard equipment, from the fact that they belonged to the 1910 design. Since then new designs have been adopted universally, wherever state owned and operated telephones exist.

The principal characteristics of the 1910 equipment are the following: The long distance lines (in this case interurban lines or any line running outside of city limits being called long distance) are connected like ordinary subscribers lines over a main and intermediate distributor frame and then to the call signals. The relays are arranged outside of the switchboards on a common frame, while the call lamps along with the answering jacks are placed in the answering panels of the switchboard operators' places. The long distance lines do not end, as was the case in older systems, in plugs with cords, but in jacks. The operators' places are equipped to correspond with pairs of cords. Every pair of cords is provided with call and cut-off connections and switches to both plugs and is provided with answering and listening keys. Through this the special answering and listening key of the older type equipment was eliminated, which makes operation somewhat simpler. In addition three section parallel jacks are used everywhere; the plugs and jacks are of the same construction as those used in the local exchanges. The changes which have been made in this equipment may be summarized somewhat as follows:

Main Distributor—Connecting the long distance lines over one main distributor is being introduced in all exchanges. In past times it was customary to connect the long distance lines, regardless wether they came from overhead wires or underground cables, as soon as they had entered the exchange building directly to the jack switches. This gave a certain rigidity in service, because it was difficult to change the arrangement of the telephone connections once they had been introduced and connected a certain way. As it was necessary either to add new lines from time to time or change the system of operation, the connections at the jack switchboard frame have to be changed, and this can be done best if the lines are connected directly to a main distributor. The general importance of the main distributor-connecting and gathering point of all incoming and outgoing lines in the exchange, from which the distribution to the various details of the station equipment takes place, make it seem natural to have the long distance lines participate in this movement towards simpler service. Where long distance lines reach the exchange by aerial wires and underground cable, in the last case usually along with local telephone lines, the main distributor is the proper point to concentrate all the lines.

The main distributor for the distance lines need not be a separate frame; taken on the basis of general practice, it is even of greater advantage, if it forms a common frame with the local wire principal distributor. The long distance lines can then come in on the vertical side at any given point, whereas on the horizontal side a special row of solder connections can be put in strips to connect with the jack strips and switchboard. In smaller and medium size exchanges, especially where local and long distance telephones are in the same room, the main distributor, and also the intermediate distributor and the relay frame are best installed together. The result is an easily inspected harmonious arrangement of the distributor room, in which main distributor frame, intermediate distributor and relay frame appear as three parallel frames. In larger exchanges it is advisable to install a separate main distributor, since the extent of the exchange usually requires a separate room for long distance calls anyway, and a proper placing of the long distance wire main distributor frame may mean a considerable saving in cable material. As connecting points for the long distance lines at the main distributor as a rule they use on the vertical and the horizontal side strips for 20 lines. In designing the frame, allowance is made for the probable requirements for a period of 15 years. This main distributor frame can also be used for other purposes, as for the connection of ring shaped repeaters when using the long distance lines. In this case two groups of solder strips are used: One on the vertical side for the cables to a repeater frame and a second one on the horizontal side for the connections to the jack switches.

Jack Switches and Switchboard—The jack switches and jack frames have to fulfill two objects: 1, a handy method for the testing and inspection of lines and 2, to serve as auxiliary aid to proper operation.

In the testing of telephone lines for the purpose of eliminating disturbances the main question is that of speed and accuracy of measurements. To increase the speed of measurement, toggle joint switches have been used, each of which has only one object. The switches have therefore only two positions, a rest and a working position. Accurate designations give the necessary information as to the office of the various switches. To obtain sufficient accuracy, sensitive measuring instruments (ohmmeters) have been introduced, which enable the inspector to read the line resistance and insulation resistance directly. The measurements are usually made so that the proper line and the suitable measuring instrument are connected by the toggle switch and then the measurement is made with the proper instruments. There is also a special position for use in a four wire system, whereby the long distance lines can be tested without interrupting

service. To this end a branch line coil is used, to which is connected the measuring battery. Between the branch to be tested and the one-half of the coil the measuring instrument is connected and on the other side of the line a balancing resistance is connected with the second half of the coil. By interchanging the branches of the lines the insulation value of each branch can be recorded.

A recent improvement which has become necessary with increased use of long distance lines for duplex telephoning consists in this, that a ring repeater is connected to each long distance line operated. There are four jacks provided for each long distance line: A jack which we will call *Kl* for the long distance line coming from the outside, a jack *Ka* for the line going into the exchange to the intermediate distributor frame, two jacks *Krl* and *Kra*, which are connected to the secondary or the primary winding of the ring repeater. The connecting springs of *Ka* and *Kl* are directly connected, when no repeater is connected, at other times their connections lead from the springs of *Kl* to those of *Krl* or *Kra* to *Ka*. The wire connections made necessary for the use of the ring coil repeater are provided on strips which are easily accessible on the rear side of the jack switchboard. Outside of the previous named four jacks there is still a fifth one *Km*, used for listening in, which is branched off from the springs of the jack *Ka*. This facilitates listening as compared to the former arrangement, in which only two jacks *Kl* and *Ka* were at disposal and were to prevent interruptions when plugging *Kl* auxiliary connections had to be made.

The ring repeaters are not connected directly to the strips of the jack switch frame, but indirectly by way of the main distributor frame. To this end the jacks *Krl* and *Kra* are connected from the jack switches by cable with proper solder connections on the horizontal side of the long distance exchange main distributor frame. Opposite these on the vertical side are other solder strips which in their turn are connected by cables with the ring repeaters which are installed on a special type of frame.

The outer form of the jack switchboards has been changed in that all of them are built in only one size, each one being able to hold 100 long distance lines. In larger exchanges as many of these units are installed as is found necessary. The connection between jack strips of the various units is made either by long cords or else by jacks which pass from switchboard to switchboard. In the smaller exchanges the jack switchboard can be set in line with the general multiple switchboards. The question where a jack switchboard, which is set up as a separate group is to be placed, has found the solution by placing the jack switchboard in a space near the supervisor's switchboard table along a diagonal wall. This solution offers the advantage that the supervisor always has this jack switchboard handy to test telephone lines and can make these measurements without any loss of time. In larger exchanges the jack switch frame can be placed in the room for the distributor frames.

Repeaters—Two types of repeater are used in long distance work: One is used for connection of long distance line with local subscribers' lines, the other for service in the long distance line, as soon as it is used for duplex or simultaneous service. In both cases only repeaters with ring shaped iron core are used, as these offer the most favorable opportunity for efficient telephone current transmission.

Distance Jack Lines—These lines are connected in the long distance switchboards in multiple and are used for through or relay service. Of the pair of cords used for such long distance through service, the answering plug is placed in the answering jack of the one long distance line, and the connecting plug in the long distance jack of the other long distance line. The long distance jack lines are not connected permanently with their telephone wires but are connected by the operator at whose switchboard the call has come in, by means of her key. The operation for such a through call is something like this: The operator *II* who wishes to connect a long distance line *a* at her switchboard with another line *b* calls the operator at whose switchboard the line *b* terminates by means of her trunk wire, and informs the operator *I* that the line *b* is to be used for through traffic. The operator *I* connects the long distance line with her key, whereupon by means of the multiple jack, the line *b* is used by operator *II*. As soon as operator *I* uses the key, a closing signal lamp below the key lights up and is extinguished after the operator *II* has plugged the line. When the *II* operator removes the plug from the jack of the *b*-line, this lamp will light up again.

Long Distance Trunk Lines—The long distance trunk lines are likewise connected in multiple over the long distance switchboards and are used for the interchange of information between various exchanges. Several of the new exchanges use only as many trunk wires as there are operators' places in the long distance exchange. As the average number of trunks is therefore only two or three, the service over these wires has been simplified considerably. These trunks are not designated by special strips in the multiple panels, but are given running numbers which are painted on the lenses of the individual trunk lines.

Simplified Long Distance Service—The improvements in this line are partly of a technical nature, partly of the nature of service regulations. Greater speed in long distance and better utilization of the lines is the object. The greatest speed would be reached, if there were ready an open long distance line for every call which comes in. This would require as many lines as is the probable number of calls at any one time. Since the calls are very irregular, it is obvious that most of the lines would be without calls at various times, if such a plan were used. The complete utilization of these lines would require a close sequence of calls during the entire day, possibly without much interruption. This condition is met, if the calls as they come in are collected and attended to in rotation; this however means periods of waiting. In operation a balance between the various factors will have to be reached. The more the traffic is composed of near suburban calls (interurban calls) the more possible it will be to shorten the period of waiting by installing a sufficient number of lines, because the cost of line material due to the short distance is not prohibitive. With increasing length of lines the degree of utilization increases in importance. The period of waiting can be shortened here as well, if the traffic is very voluminous as between Berlin and Hamburg, where the peak traffic loads are not so very great when compared to the average traffic during the day. In general the waiting time should not pass beyond a certain amount, as this will interfere with efficiency. The less traffic is on a line, the worse will be the factor of utilization. These facts point to the conclusion, that up to a certain point the good utilization of long distance lines demands longer periods of waiting and vice versa. The limit, how far one can go in one direction or the other will be decided by the tolls for the conversations. The fewer lines have to be installed for the same amount of traffic, the smaller can be the toll charge. Shorter periods of waiting require more telephone lines and must have a tendency to increase the toll charges. Those who

have urgent conversations can reduce their time of waiting by paying extra charges and taking precedence over other calls.

The improvements which can better service may be installed either at the incoming or the outgoing end of the line. When carrying on a conversation between two direct long distance lines there are usually only two operators involved, whose duties differ in some respects. As is the case in local telephone calls, the first operator (*A*) at whose switchboard the call originates will have to call for the desired number, make the connection and watch it to its termination, while the second operator (*B*) plays the part of an auxiliary only. To carry this principle over to long distance traffic several solutions are given.

Omission of Trunk Service—In the usual system the operator at the incoming end of the line (the operator *K* as against operator *G* at the other end) has to reach the desired subscriber by first calling the operator of the other exchange over an interoffice trunk wire. This practice can be eliminated, as soon as the operator *K* has the subscriber multiple panel in front of her. By omitting the necessity of calling on a second operator the service is simplified and shortened. Presupposition for such service is, that every multiple jack of a local line can be used for long distance connections, consequently any operator's place in the exchange used as long distance operator service. The subscriber's line is designated as being used for long distance traffic by using a magneto ringer tone. This is however not always applicable, for the cost of such installations grows with the number of subscribers. The annual cost for these jacks must be compared with the saving in cost for the trunk switchboard operator, her switchboard and the relay equipment for the trunk lines. The comparison as a rule is favorable only for exchanges up to about 3000 subscribers, because here the trunk operators are not used as much as in bigger exchanges. In larger exchanges this equipment will only pay where there is a great deal of long distance traffic.

Elimination of Recording—Under the old system the K-operator had to keep track of the long distance calls, their origin, destination and time, all operations which took considerable time. This time can be saved by omitting this recording as is done in long distance calls over shorter distances, thus giving the operator more time to attend to actual making of connections. If this operator has the subscriber multiple field right in front of her, she can make more connections, if she is not hampered by recording the calls. In this case greater speed can be obtained by substituting one cord for the pair of cords, eliminating the use of the answering cord. The one cord system can be used either for call or for inter-office trunk service, just as conditions demand.

Magneto Service—For better use of long distance lines, especially for greater distances, the practice has been followed for a number of years of using magneto ringer service for interchange of service communication between the K- and the G-operator. The magneto currents are sent into a receiver, which up to a short time ago ended in a megaphone which gave the magneto buzzes plainly into the operator room. But this gave rise to disturbances and at present these signals are sent to the head receivers of the operators. The wiring is such, that when a telegraphic or magneto call is sent to an operator her signal lamp lights. By using a small switch the operator connects herself into the magneto circuit. When taking the magneto signals the enquiry keys of the pairs of cords must remain at rest position in order to prevent passage of the magneto current into any connections made at the same time. In a few cases the head receiver is permanently connected to the magneto circuit, in which case an experienced operator can take the signals sent from this source along with her regular work, without interference with the latter; the ringer noises are then damped so as not to disturb the operator in her conversation.

Call Slip Service—The use of mechanical devices for the transmission and transportation of call slips and other instructions from operator to operator has grown considerably within the last few years and offers a great advantage over the antiquated method of distributing the slips by messengers or handing them from operator to operator. As this section of an early issue of Telephone Engineer will take up one of the most recent mechanical systems, installed in the new Telegraph and Telephone Central building of the city of Munich, no attempt will be made here to describe the system in detail.

Lighting—As is the case in local switchboards, long distance switchboards have recently installed lights and lamps in channel forms. The channels, instead of being continuous, are about two inches long and hold two 16 c. p. metal filament lamps in pear shaped form. Such a light is placed in the center between two long distance boards. The lamps have two separate circuits, each one of which can be cut off or switched on. The wires for the lamps are passed within the switchboards in iron pipes. —*Telegraphen und Fernsprech Technik.*

RELAY TEST STATIONS IN LONG DISTANCE LINES.

In case of trouble in long distance telephone lines a rapid elimination of the trouble is the first prerequisite. The limitation of faults will be facilitated considerably, if there are a large number of test stations, which can make testing connections in a short time. The quickest service can be rendered by the jack switch frames found in the long distance rooms of exchanges. In this case the long distance lines after their entrance into the exchange building must be passed in long cables up to the jack

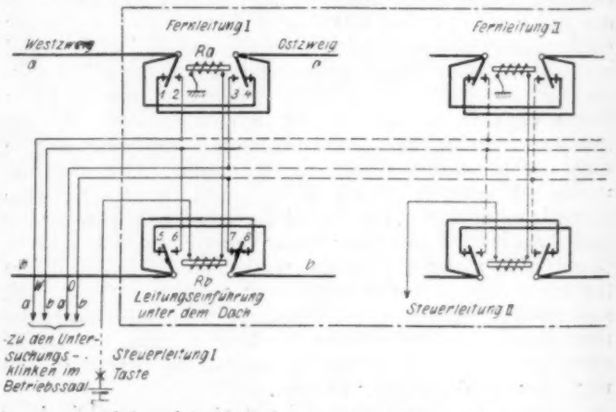


Fig. 1. Wiring for Testing Long Distance Lines.

frames. The addition of capacity, and the addition of a piece of cable or electrical apparatus with other electrical properties is not favorable to good transmission of sound, however. This disadvantage is eliminated if the test stations are installed immediately behind the place of entrance of the cable into the building, i. e., in the basement. If, however, the place of entrance of the cable is not very accessible, time is lost in making the connections for the fault finding tests. To avoid all this, relays are used with whose help the tests can be made from the operating room of the exchange.

The wiring for such a relay is shown in Fig. 1. For every long distance line to be tested, say line *I*, two relays are required, *Ra* and *Rb*, each of them connected to the *a*- and the *b*-branch, which are connected to a switchboard placed in the exchange. The telephone wires are so connected to the relay contacts, that in the rest position of the two relay armatures the west branch is connected directly with the east branch. To safeguard the line connection at the interrupter contacts of the relay armatures to the highest degree, the back contacts *1* and *4* in the *a*-branch, and the back contacts *5* and *8* in the *b*-branch have been placed in parallel.

If from the exchange switchboard by pressure of a key current is sent over the line, then relays *Ra* and *Rb* draw up their armatures, whereby the lines *a-b* of the west and east branch are connected to the testing lines, connected to the working contacts *2, 3, 6, 7* and leading on to the main exchange room. After finishing the line test, the current is cut off by means of a switch and the long distance line is again connected for telephone service.

If several long distance lines are to be inspected, the test lines leading to the exchange room can be united as is seen in Fig. 1. Consequently there need be only one special switch connection and only one line for each long

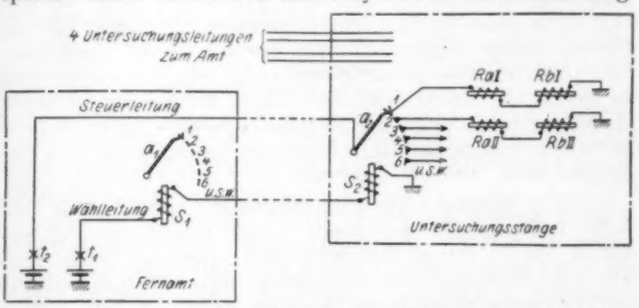


Fig. 2. Test System for Connection Between Telephone Pole and Exchange.

distance line along with the necessary relays *Ra* and *Rb*. From the common test connections branch wires can be run to the working contacts of the relays. Relay test stations of this type can also be employed on telephone poles, where the connection of long distance lines to the exchange would be impossible for some reason or other. To save line conductor strands for the connection from pole to the exchange, which are usually only at disposal in limited number, it is advantageous to use the test lines leading to the exchange (4 strands) for several long distance lines in common. Fig. 2 shows a system for this purpose.

From the exchange to the pole a special selector line is sent, into which the ratchet gears *S1* and *S2* are connected. By sending out current impulses, as for example, with the aid of key *t1* the arm *a2* is sent in rotation to the contacts *1, 2, 3*. These contacts are connected with the test relays *Ra* I, *Rb* I, or also *Ra* II, *Rb* II, of the individual long distance lines, I, II, etc. At the rotating point of arm *a2* is the connecting wire coming from the exchange. The action of the arrangement is as follows: By means of the selector system the arm *a2* is connected to the contact, at which lie the two relays of the line to be tested. Hereupon the relays are made to operate by pressure of the key *t2* and thus the long distance lines are connected to the test lines at the exchange. The gear and ratchet arrangement *S1* installed at the exchange works synchronously with *S2* and shows through the position of *a1*, at which contact the arm *a2* is at any time. As gear system *S2*, a selector, which has a continuous forward movement and possesses 10, 20 or more contact parts can be used to advantage. For *S1* a recorder similar to those used in exchange to count and record calls can be used. If *S2* has, say, 20 contacts, the position *a2* can be read without trouble from the ten and unit digits. If the counter stands at 4332, this means simply, that *a2* is at the contact 12.

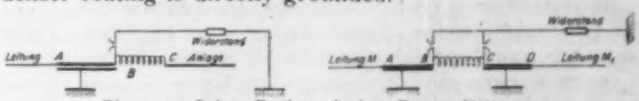
The conditions under which these relay test stations on telephone poles work are very difficult owing to their exposed nature. The relays and the ratchet wheel and gears must be encased and the wire connections well insulated and protected. The lines leading to the exchange should be safeguarded with cut-outs, safety fuses, etc. Prerequisite for efficiency of this test arrangement is the faultless condition of the test lines, which means regular inspection and measurement.

The readings of the terms in Figs. 1 and 2 are as follows: *Westzweig, Ostzweig*—long distance lines, east and west branches; *Leitungsführung unter dem Dach*—connection of wire under roof; *Zu den Untersuchungsklinken im Betriebssaal*—to the test jacks in the exchange room; *Taste*—key; *Steuerleitung*—line connection. *Fig 2*: 4 *Untersuchungsleitungen zum Amt*—4 test lines to the exchange; *Wählleitung*—selector *line; Fernamt*—long distance exchange; *Untersuchungsstange*—test telephone pole—*Fernsprech Technik*.

PROTECTING ELECTRIC LINES AGAINST HIGH TENSIONS.

High tensions which will endanger the equipment and lives of employees can often occur due to atmospheric discharges, strong and sudden overloads, or resonance phenomena. These high tensions or overloads are, unless they are of an electrostatic nature, in form of oscillations and form electric waves of greater or smaller frequency, whose periodicity is always higher than the ordinary frequency of the power plant or the exchange. Such a wave changes especially in places of the current circuit, at which the capacity or the self inductance resistance change, and the excess voltage there is usually very high. These reflex phenomena can also produce stationary waves, which act all the more disturbing, if they stand in resonance with their own waves of the current circuit, the danger lying not alone in the extent of the overcharge and excess voltage but also in the long period of this charge.

There have been numerous safety devices and excess voltage cut-outs used, which pass the excess voltage into the earth or ground it. The lack of protection lies not so much in the call for suitable apparatus, as in the problem of finding the right spot in the plant where the highest excess voltages are found and where the conductor is to be placed. This spot changes in every plant with every wave oscillation and the protection here described was worked out by two Italian engineers, Pizzuti and Ferrari. Their safety device connected to the circuit is supposed to fix that point, where the highest voltages have to appear, so that the cut-out here connected will always conduct the excess charges to the ground. The diagram for the device is shown in Fig. 3 and consists of a condenser *AB*, whose one coating is connected in series with the line and placed between this and the plant, while the other condenser coating is directly grounded.



Figs. 3-4. Safety Devices Against Excess Voltages.

Likewise in series with the line and the capacity *AB* is the self induction coil *BC*. In this way two objects are connected into the line, one of which, *AB*, has a very small natural resultant resistance $\sqrt{\frac{L}{C}}$ while *BC* in contrast has a very high natural resultant resistance. Every oscil-

lating wave coming from the line is totally reflected in point *B* and at this point an oscillation loop will form. Consequently a conductor connected to *B* will conduct into the earth an excess voltage. The wave coming from the electric wires is first reflected at *A*, without change of polarity, so that here we have a decrease in tension. This decrease in tension is much smaller than the increase in voltage, which the potential reches at *B*, because the variability of $\sqrt{\frac{L}{C}}$ between *AB* and *BC* is much greater than that between the line and *AB*. Consequently we will have a much higher voltage at *B* than exists in the line. It might be mentioned that the energy of the wave originating in the electric wires is not only carried off to earth by the conductors connected to *B*, but also finds a conductor in the dielectric of the capacity *AB*.

Even if a part of the wave were to extend past point *B* towards *C*, the parts *AB* and *BC* are so proportioned that the time used by the broken wave for its extension from *B* to *C* is equally great, or greater, than that period of time which the reflected wave needs in order to reach from *B* to *A*, so that the conductor connected at *B* has already conducted the excess voltage to earth, when the broken part of the wave has reached *C*. The plant is therefore fully protected against excess voltages and the practical results obtained with this system have justified all claims made by the inventors.

This principle, however, also solves the problem of excess voltages that may occur at both ends of the line, as for example in long distance lines, and also for such cases where the melting of safety fuses, poor switches and failure of automatic cut-outs has caused excess voltages. For these cases the arrangement is that shown in Fig. 4. Every excess voltage coming from *M* is reflected in *B*, while the excess voltages coming from *MI* find their reflection in *C*. The values which are used for the computation of self induction coils are no larger than those which are usually used for these coils in electric lines, and the capacity is about equal to that of 660 to 1000 feet of wire. The conductors for the excess voltages, which are connected to those points where the oscillation loops form, can be selected from any system on the market.—*Elek. Zeit.*

Proposed Independent for Nebraska City

O. G. Leidigh of Nebraska City, Neb., and H. T. Glessner of Ohio have prepared an ordinance and presented a copy to each of the three city commissioners, asking for a ninety-nine-year telephone franchise in Nebraska City. The ordinance specifies that the city shall give them rights to the streets and alleys within a certain district for a period of ninety-nine years and subject to certain conditions imposed on them. It is also particularly specified in the proposed ordinance that the grantees shall not, except as hereinafter provided, sell or transfer their conduits, poles, wires or appliances of any kind to any person, company, trust or corporation now or hereafter engaged in the telephone or telegraph business, and shall not at any time enter into any combination, directly or indirectly, with any person or persons. It is provided, however, that nothing in the ordinance shall be construed to prevent the grantee from leasing portions of its conduits to any telephone or telegraph, or other companies desiring to use the same or any portion thereof. And nothing shall be construed to limit or abridge the right of the grantees to make contracts with outlying exchanges for the division of the tolls earned over their joint lines.

A combination on rates with any other company, without the consent of the city authorities, is also forbidden, according to the terms of the proposed ordinance.

Mr. Glessner was in Nebraska City about a year ago. The proposition of an independent plant was taken up then, but nothing came of it except many newspaper stories. The presenting of the proposed ordinance by Mr. Leidigh seems to indicate that the proposition has not been forgotten. Local capital, it is said, will be behind the venture when the time comes to organize the company.

North Dakota Traffic Convention

The traffic department of the North Dakota Telephone Association closed a successful session with a banquet July 12 at the McKenzie hotel, Bismarck. C. H. Core, general manager of the Northern Telephone Company, Minot, was toastmaster.

Automobile rides, a visit to Camp Lincoln and theater parties were the diversions sandwiched in with two days of practical lectures and conferences, designed to give greater efficiency of service.

Miss Mae Tyrrell, chief operator at Fargo, told of the necessity of welfare work for telephone employes. She told what is being done by the larger exchanges to make the home life and social diversions of their employes more pleasant and wholesome. The result is better operators and the investment is one that pays big dividends in improved service.

F. L. Shuman, district manager of the North Dakota Independent Telephone Company, Bismarck, extolled co-operation between the various companies. He said that the North Dakota concerns worked together better than those in other states, that messages are promply relayed, and that there is no unfair competition.

Cupid has a friend in A. S. Kelly, general traffic superintendent of the Northwestern Telephone Company, with headquarters at Omaha. He confessed that every company looked forward with fear and trembling to June when Dan is most active at the switchboard, but that the trained employe, whether she remains ten months or ten years, is loyal, efficient and intent upon her duties, and that as long as she stays on the job matrimony, present or prospective, is relegated to an incidental background.

It it a libel, he added, to declare that a girl looking forward to a home gives less attention to her work.

Mr. Kelly declared that North Dakota did more long-distance talking per capita than any other state in the union. He attributed this to the efficient service given.

The next meeting of the traffic division will likely be at Fargo. Last year it assembled at Minot.

Postal Gives Rates Out of Chicago

New long-distance telephone rates, which are from 20 to 50 per cent under the Bell Company's rates, are announced by the Postal Telegraph Company to many points within a 200-mile radius of Chicago. The Postal company is fast simplexing its wires for combined telegraph and telephone service and will shortly have a long-distance telephone service in operation between the principal points in the East and Middle West at rates materially lower than the Bell rates.

The Wastefulness of Monopoly

Prosperous Nations and Big Business Combinations Often Court Disaster

BY TERRY W. ALLEN

BUSINESS ethics can only be what the business men of the country make them, and if the business ethics that are made are along reasonable, sensible and conservative lines, the interference from courts, public service commissions and other forms of government regulation, both state and national, would not have to step in and curb the many illegal practices that business men of today seem to like to cause.

There can be no question that the conditions existing in so-called high finance or manipulation are such as to cause thorough students of economical conditions in this country to have grave fears as to the future to which such a course will lead; and the economist who tackles this question can do nothing more than shake his head and point to the long line of historical precedents that have gone before and have invariably led along the single road to ruin.

Congress is but a reflection of the people that it serves. There can be no question that the national financial condition is as rotten as it can be. Congress is wasting money in huge lumps upon almost every conceivable thing, the majority of which things are without merit, and without any real value to the government.

The people of this country are used to waste. They are used to junking what appears to be in their way. Thousands of millions of dollars have been wasted in this country because no efficient and sane business methods were applied to save the waste. This is true of our lumber, of our oil, of our iron and of our other large manufacturing industries. We pay high prices and we get inferior products. We pay for the waste, but get no benefit from the waste. And as our Federal Government is a reflection of the people's minds we cannot but see that the American people like to waste and that they will have to pay for this stewardship some day.

The American Telephone & Telegraph Company is but a smaller replica of our national government in its methods. It is built up along the same lines and it is financed along the same lines. It spends just as much money foolishly as the federal government does in proportion.

From the Leavenworth, Kansas, *Times* we quote a portion of an editorial, as follows:

Don't allow the telephone case to go by default. See to it that the matter is gone into thoroughly. The telephone company as well as the users of telephones ought to be willing that an expert shall look into the business and report his findings to the State Public Utilities Commission. The committee of business men who arranged the merger three years ago, estimated that the necessary assets of a telephone company for Leavenworth would not exceed $250,000. The telephone company's report to the city commissioners made last August shows that they are claiming assets to the amount of $574,700, and the city is asked to pay dividends upon this amount.

This editorial shows that a merger took place three years ago; that the estimated assets of a telephone company for Leavenworth would not exceed a quarter of a million dollars, but that the same company's report to the city commissioners claimed assets of practically $600,000 or more than double the amount that a number of business men stated would be sufficient for all purposes concerned. There has evidently been a waste in this case of about a quarter of a million dollars. And this same thing has been going on all over the United States. Competition has been eliminated at fearful expense. Plants have been bought out and the bonds and stocks pyramided and with no adequate deduction for depreciation for the many years that the company has run. And like the federal government's financing, they are finding it more difficult every year to give an adequate excuse for the waste in years previous.

These merger matters are not all proving satisfactory. In fact, we have a clipping from the Kearney, Nebraska, *Hub*, from a Nebraska town, which shows that the people in that section appreciate just what will happen when a merger goes through. From the *Hub* we quote a portion of some resolutions passed in connection with a merger in that section, which are as follows:

And whereas, experience teaches us that to do away with competition, the rates on telephone rental will be higher, and the service inferior; this condition invariably exists in different parts of the state where the merger has been accomplished, and the bills introduced in our legislature are all on the line to do away with competition, and thereby leaves us without recourse and at the mercy of a monopoly that will be a menace to public welfare, not only to our farms, but also to our towns and cities.

I heartily commend the sentiments expressed in this resolution, and I believe that a little more exploiting of these merger conditions will bring about a reform that will be lasting.

We are living in a prosperous time, and in prosperity we are not as likely to take close account of our conditions as during adverse times. The best legislation is enacted not in times of prosperity, but in times of depression when money values are more easily appreciated. It is for this reason that we cannot expect any real constructive legislation at the present time. That is probably why the Department of Justice has made no progress against the trusts. That is why they are idling away their time, losing opportunity after opportunity to bring offenders to the bar of justice, simply because of the fact that a prosperous nation is not a nation to bring to justice offenders of its laws.

The American Telephone & Telegraph Company has escaped thus far. By numerous methods of compromise and throwing dust in the eyes of those who would help bring it to justice, it has escaped thus far, but a day of reckoning is coming, and when it does come, the practices of the American Telephone & Telegraph Company that are going on today will not be so lightly passed over.

Bristol and Cumberland to Merge

The people of Johnson City, Tenn., have accepted the proposition to consolidate the interests of the Bristol and Cumberland telephone companies, and thus hereafter have only one exchange, reached by all through lines. The Bristol Telephone Company will submit a similar proposition to the citizens of Bristol at a mass meeting in the board of trade rooms on Friday evening. In the event the proposition is approved Manager Albert Parlett of the Bristol Telephone Company states that his company will take over the entire business and will co-operate with the Cumberland Company in the handling of all long-distance business. The proposition contemplates a new exchange, with new equipment, a new general office building, etc.

When Telephony Was in Its Infancy

Tri-State Veteran's Address Before the Albert Lea Club in Minneapolis

BY GEORGE W. JOHNSON*

WHILE we as boys were trying out our first telephones, which were constructed of fish lines, baking powder cans and cigar boxes, the telephone people were using telephones not very much better. Their equipment consisted of two receivers, or just the same as two receivers, one to talk into as a transmitter, the other to be used as a receiver. No batteries were used for transmitting.

What the telephone companies used as this time for a switchboard, I don't recall. I do remember, however, my first actual experience in the telephone game. When I was about fourteen years old, or about the year 1886 or 1887, I took a job as office boy with the American Express Company at Albert Lea, Minn. This was also the telephone exchange office, both being under the same management.

At that time the system at Albert Lea had about twenty-five subscribers and *some* service. The manager gave me strictly to understand that the express business was the more important of the two and that, in no case, should I attempt to take care of the telephone business should there be anything about the express business that required my attention.

The switchboard was an excuse of a board. I still have one of its keys on which I spent considerable time studying as to how it worked. The telephones had the old Blake transmitters and the service was exceedingly bad. There were no long distance lines at this time, the telegraph being the only means of carrying on quick communication at a distance.

Along about the year 1889 service became so poor that the people refused their patronage. It was, therefore, discontinued and all equipment was removed. There was no telephone service in Albert Lea from then on until the Spring of 1894 at which time the Strowger automatic system was installed. This was the second automatic plant ever installed, the first having been placed in service at La Porte, Ind., a purely experimental plant. Of course, I had the misfortune to get tangled up in this undertaking.

This telephone plant was very crude, but even so, the public was well pleased with it after putting up with the service rendered by the Bell interests. In the outside construction we used three line wires to each telephone and a feeder of No. 10 copper wire, connected common, so you can plainly see that as the plant increased from the forty original subscribers to about sixty-five, we soon filled our pole leads up with wire, having no available money to purchase cable, which at that time was almost unknown in small exchanges.

The switchboard, or switches (there being a switch for each subscriber, and the system limited to ninety lines) was somewhat different in appearance from any other switchboard. It in no way looked like telephone equipment, having more the appearance of so many clock works, twenty to each shelf.

Each switch was made up in a manner similar to the works of a large clock on its back, with the dial turned upwards, the dial being about four and one-half inches in diameter with a shaft extending up through the center, on which an arm was mounted with a crooked end for making contact with ninety wires. The ends projected up through the dial in a circle near the outer edge. This arm was so arranged that it was lifted to clear and travel around to any one of the desired contacts, forced by magnets and rackets, to the subscriber's line wanted. All subscribers were represented by the little wires terminating on the outer circle of the disk, the connections, when made, being common.

These switches were operated, or were supposed to operate, by contacts made at the subscriber's station by a calling device bringing the different lines in contact with the feeder or battery lines, thus energizing the different magnets of the switch. One of the line wires was known as the unit wire, one as the line wire and the third as the release wire, or at least this wire was supposed to release. I think that I released more switches in one day than this third wire did in a whole year. I often told the manager that the release part of the equipment could just as well be omitted.

As the arm rotated about the disk there was a little brass weight hung from a silk thread that wound up around the shaft. When the switch was released the shaft was raised so the arm cleared the contacts. The weight would restore the arm to its normal position, providing it worked properly.

There was no "busy back" or "non-interfering" device on this switchboard, except what was accomplished by hand at the office. The energy which supplied the switches was made up of about fifty volts of salammoniac batteries, the telephones being local battery sets with two of the same cells to each telephone and some job it was to keep these batteries alive.

My work mostly was looking after the switches, seeing that they returned to normal position when released. If they remained on one number an unreasonable length of time we took it for granted that the subscriber had failed to press the release button and would then have to listen in. If conversation had ceased, we released the switch by hand.

The next busy job was looking after the batteries. The man who atended to this work made a round of the telephones every thirty days with a two-wheeled cart. The cart was loaded with battery replacements such as zincs, carbon, extra glass jars and a small barrel containing the solution which was ready mixed for use. The barrel was equipped with a faucet to make it convenient to draw off the solution.

I would like to say here that about the time the equipment was installed and in working order, we got our first long distance line. This was a grounded circuit north to Owatonna and from Owatonna to Austin. We were, however, awfully surprised when we were able to talk to either place without straining our lungs. Everyone who used the telephone to any extent, in those days, eventually got so they could make any deaf man hear. I sometimes think this was the main reason why we all had such good lungs.

The telephones which were used in connection with the automatic system at this time, were purchased from the Standard Telephone Manufacturing Company of

*Mr. Johnson is district superintendent of the Tri-State Telephone and Telegraph Company, and his address is borrowed from the company's house organ, *Our Emblem*.

Madison, Wis. The Bell Company's patent on the transmitter and switch-hook had not yet expired, so it was necessary to use the Bell transmitter, better known as the old Blake transmitter, or the old button transmitter. It had a diaphragm and vibrator with a thumb screw adjustment that had to be readjusted at least every hour and sometimes every time it was used. Occasionally it really did talk up well. We were forced to pay a rental of $6.00 per year each for these transmitters, whether they talked or not, and now the rural people kick when we charge them $3.00 per year for exchange service. The switch-hook patent we got around by using an arm rest with the cut-out in and a dummy hook to hang the receiver on. This was not very convenient, of course, but there was no other way to get around the difficulty.

The automatic attachment, furnished by the Automatic Electric Company of Chicago, was a box about six inches square with push buttons, this box to be mounted above the telephone. In calling your party you pushed the different buttons for any combination of numbers wanted, the buttons being marked by a little nickeled strip, units, tens, hundreds and release. After calling the number wanted you would turn a crank to ring your party.

When through talking, providing you got your party, you were suposed to push the release button to restore your switch to normal position. Of course, the subscriber nearly always forgot to do this, which made it necessary to release the switches by hand at the office.

As luck would have it, though, shortly after the plant was put in operation (I do not remember the date) the patent on the switch-hook expired. This allowed a wonderful improvement to be made on the calling device by having a switchboard inserted in the calling box. This released the switch automatically when the receiver was hung up. We continued to use the arm rest to cut in the talking and listening circuits for quite a little time before the two features were consolidated into the switch-hook, which had a long leverage and worked up and down a distance of about six inches—when it worked at all.

Later on we rebuilt all of these old telephones in our own shop. We placed the switch-hook in the transmitter box, thus doing away with the army rest and the automatic box. We also located the keys or push buttons in the face of the magneto box. Then we had a fine looking telephone which we thought was about perfect, but the Strowger people were busy also. They notified us that they had a new switchboard perfected and were going to change our board for one of the new type. They did this shortly, I do not recall the date, but at any rate it was a great improvement.

The new syitchboard, when mounted, lotoked considerably like a large sized grand piano, with the switches about where the keys would be. A long shaft extended over the wires, which were stretched the full length of the board, and little wipers were placed on the shaft to come in contact with the different wires as the shaft moved in or around as the calling buttons at the telephones were manipulated. This was known as a 100-capacity switchboard. The third wire was done away with, using two line wires and a heavy feeder of No. 10 copper wire, common, as mentioned before.

Then came another big improvement, a 200-capacity switchboard, which was a welcome change, as we were then getting more business than could be taken care of with the old 100-line board. The automatic company also began about this time to make its own telephones. These were about the same as the old ones we had rebuilt and were followed shortly with a dial telephone with a wide battery box for two wet cells, which were the only batteries available at that time.

Improvements came rapidly after that in the shape of a new and shorter stroke switch-hook, the patent running out on the transmitter and the carbon diaphragm transmitter coming into service. This was a wonderful improvement over the old Blake transmitter. A good practical dry cell coming into service greatly reduced our troubles and work and I can assure you we were very thankful for all of these improvements and ever ready to adopt the new ideas and new equipment without much teasing. It wasn't the Western Electric Company that was making these improvements, either. This company was fighting them in an attempt to tear down everything in the shape of competition.

The 200-line individual switch was somewhat similar in looks to the switches now used. The subscribers' calling device, with the dial, was very large, quite complicated and subject to lots of trouble. The service, however, was quite good, even fine for a time, compared with the service rendered shortly before by the Bell system. Of course, there wasn't any first-class telephone service in those days compared with the service of today, for the reason that equipment, which might render such service, was not available. Improvements were held back by patents held by the Bell system and this latter organization attempted to keep everybody else out of the field.

While the manual system was in operation the telephone company profited at the expense of the subscribers, but, after the automatic system was put into operation the subscribers profited at the expense of the telephone company.

At the time the 200-switchboard was installed the Bell people began stringing in new toll lines, using copper circuits. They refused to connect with our apparatus because we refused to use their transmitters and receivers, paying therefor a good fat rental. They finally consented, however, and a contract was made with them for long distance service and the automatic system got busy talking over the Bell toll lines.

Along about this time I talked with Mr. Critchfield in Chicago. He was, at that time, general counsel for the Strowger Automatic Company. I talked from an automatic telephone from my residence and the service was very satisfactory. From this time on, both long distance and local telephone business grew very rapidly.

Rochester had installed one of the 200-line switchboards, but on account of some trouble with the Automatic Company, which, at that time, moved its factory to Baltimore, the Rochester people threw out their automatic plant and installed the manual system. We still stuck to the automatic and later replaced the 200-line board with a 1,000 capacity board with selectors and connectors. This was another great advancement, but even at this time the automatic was very crudely made, so much so that, as the service extended we had to aply 110 volts of battery to drive the switches. This was one reason for the automatic being discarded at Albert Lea. The Automatic Company furnished no equipment, such as power plants, power panels, terminals or arrestors. In other words, it started business before being organized for the purpose. We purchased a marble slab and made our own power board and a great many unheard of attachments, some of which were later adopted by the automatic people.

The automatic system at Albert Lea was finally discarded, not altogether because it failed to give service, but because, at that time, the wrong fellows were running it. Their prices were exorbitant and we were compelled

to throw it out and install the manual to make the plant pay. Since then great improvements and great changes have taken place in automatic telephony, and different and more progressive men are at its head.

Since then the automatic system has been investigated by representatives of a great many countries, by engineers and telephone experts. In every instance it has been declared the most efficient type of telephone apparatus in existence. While the Albert Lea exchange was in operation it was visited and inspected by delegations from all over the world. I well remember when the German delegation came over from Germany and how interested the members became in the system. They remained in Albert Lea three or four days and left after declaring it was the most wonderful development of the time.

There are a great many other interesting things I could cite regarding the fight betwen the Bell and Independent systems in the days gone by and may do so in some future article.

The Lineman on the Battle Front

The difficulties of the lineman in the war zone are well illustrated by a vivid description in the London *Star* by a sapper who was in the last "big push" in Flanders. A few paragraphs from the description will show the tremendous factor the telephone and the telegraph is in the war.

The British had stormed the German first line trenches and were well on their way towards the second. The sappers doubled across the shell-shattered ground with their wire—the one link of communication between the charging battalions and brigade headquarters, hidden behind in a clump of trees. As the victorious troops rushed on, the wire was laid across the second line trenches, constant conversation assuring that communication was not broken. Then away tore the wagon again in the wake of the charging troops, the big drum of wire constantly unrolling. But now the enemy batteries were in full blast, and as the wagon tore around the bend in the roadway with the horses stretching into their stride like greyhounds, a huge shell blew horses and riders to pieces, lifted the wagon bodily and flung it, shattered, over the hedge into a field beyond. The lineman crawled out of the wreckage—the sole survivor. As he was trying to make up his mind a quotation flashed across his memory from an old Zulu war chant:

"If we go forward we die;
If we go backward we die—
Better go forward and die."

He struggled to his feet, picked up as many portable drums of wire as he could carry and took to the fields. He missed the sappers who had exhausted their supply of wire and were waiting for the wagon. He came up to his brigade, which was fighting hard to hold the ground it had won. An officer rushed him to the colonel in command. "Call up headquarters at once," he said. "Tell them I'm hard pressed, and ask for the supports to be ordered up immediately."

"There's no communication, sir," said the lineman. "The wagon is blown up and all with it. The wire is about two miles back."

"But I must have a wire! I must be reinforced at once."

"I can only suggest, sir, that I go back, find another wire and 'tee' in."

"Do it," said the colonel. "Tell the general I am held up—Germans in force—I can hold on for but one hour—I must have more men and more ammunition."

Time passed. The fighting grew fiercer. Miracles of valor were being performed, but no help arrived. The colonel held on—not for one hour, but for three, and then vast masses of Germans seemed to rise from nowhere, and come on ten deep, shoulder to shoulder, drove out the invaders by sheer weight of numbers back to the second line trenches. The gap stopped the victorious advance—right and left flanks had to fall back.

What happened to the lineman I heard afterward. For more than an hour he crawled in the wet grass and at last found a wire. He teed in, that is, scraped the insulation off the wire with his knife, and, with another small piece of wire looped over it, joined up his instrument and called. He got a reply and sent the colonel's message. They asked him where he was and which brigade was hard pressed. He told them and then became suspicious. He asked who they were. They answered the —— division. He knew that the —— division was still in Great Britain, and it came over him like a flash that he had tapped a German line in error. Realizing what he had done he dashed for headquarters as fast as he could, but a shell laid him out on the way. The Germans threw all their available weight against the colonel's brigade, which, instead of getting reinforcements, had to contend against ten times the number of the enemy. The lineman died the same day in the hospital.

Rural Lines Strong in Iowa

The investment in rural telephone lines in Iowa is between $5,000,000 and $10,000,000, according to H. W. Beyers, attorney for farmers' telephone companies, appearing before the State Railroad Commission in the telephone-transmission hearing at the state house. Ninety per cent of these lines would be put out of business by the construction of electric lines in the immediate vicinity he told the commission.

Witnesses for the farmers' companies said that the cost of converting the lines from grounded to metallic system is between $60 and $100 per mile. The change would increase the operating expense and would make the telephone a luxury instead of a convenience, the attorney said.

The witnesses for the rural companies were: George Cross of Emerson, F. E. Ferguson of Fairfield, N. Frederickson of northern Iowa, Thomas H. Dugan of southern Iowa, Ed Gayther of Charles City, and F. D. Hall of Grinnell.

Unusual Wire Cross

Among the common causes of wire trouble that have been brought to our attention recently are the following: On one of the western railroads there had been a wreck. One of the freight cars was loaded with wheat and the wheat was scattered for some distance along the tracks. The birds soon found the food and they flocked there in large numbers. While one relay of birds was eating, another flock would perch on the telegraph wires. Their number was so great that the weight sagged the wires until they came in contact with one another. The crosses caused the wire chiefs some anxious moments because of the difficulty in determining the cause of the trouble. Every few minutes the wires would come clear and just as often they would become crossed.—*Telegraph and Telephone Age.*

Telephonometry

Abstract of Paper Read Before the Institution of Post Office Electrical Engineers

BY B. S. COHEN

THE first essentials for telephonic measurment are standards for the sending, receiving and the attenuating of speech. The department's standards for both the sending and the receiving of speech are embodied in what is termed the standard transmission circuit, and consist of the essential part of a B cord circuit No. 1 C. B., using a toroidal repeater and including a solid back transmitter and 60-ohm receiver, each of which has been selected as truly representative of their class as regards efficiency. This standard transmission circuit is probably too well known to necessitate any more detailed description.

With regard to the standard transmitter and receiver, these were originally selected some years ago, and by calibrating a number of examples in terms of the original standards and re-calibrating and cross-checking at frequent intervals the original value of these standards has been carried down fairly accurately to the present day. A great deal of importance attaches to these standards, and at the present time a considerable number of reference standards have been calibrated in terms of the primary standards, and these reference standards are only employed to calibrate further working standards used in every day testing, both in the research section and test section, and by contractors to the department. These working standards are re-checked at frequent intervals against the reference standards.

Recently some electromagnetic transmitter standards have been constructed. These, having less variation than a carbon transmitter, enable a calibration to be carried out

Fig. 1.—Electromagnetic Standard Transmitter.

in less time. For example, when testing, say a dozen samples of a new type of transmitter, it is advisable to compare each of those transmitters (*a*) with two carbon standards, *b* and *c*, in order that the triangular test should indicate whether any change in *a*, *b*, or *c* has taken place, or takes place during the period of testing. With the electromagnetic transmitter this can be dispensed with. Fig. 1. illustrates the construction.

In one pattern the alumnium diaphragm is 60 mils thick, and carries an armature weighing 4 grammes at its center. The natural period of the combination when damped is about 1,000 ∽, corresponding approximately with the natural period of the solid back transmitter. The field coil is supplied with 300 milliamperes, direct current, through a high impedance coil to prevent transformer action between the field and armature coils. The gap between the armature

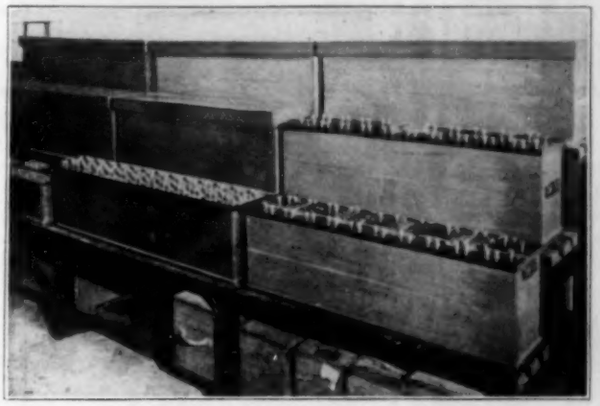


Fig. 2.—800-Mile Artificial Aerial Line.

and pole faces is maintained constant at varying temperatures by supporting the front aluminum ring on iron pillars. The volume efficiency is 42 M.S.C. worse than the department's standard. It is essential that the behavior of these electromagnetic transmitters should be identical with carbon standards under varying conditions of use for both relative tone and volume, and this behavior is still under investigation. The possibility of using electromagnetic receivers or thermal receivers, such as the De Lange thermophone, as new standards of reception, to supplement the permanent magnet receiver standard, is also under investigation. The standard of attenuation is a mile of standard cable, which has the following values:

Factor.	Constants per loop mile
Resistance	88 ohms.
Capacity	0.054 mfd.
Inductance	1.0 millihenry.
Leakance	5.0 micromhos.
Simple attenuation constant	.107 at 800 ∽
Characteristic impedance	571/42°50

The following lengths of various types of main line equal 1 mile of standard cable:

14.7	miles of	200 lb. aerial copper
26.0	"	400 lb. " "
45.75	"	800 lb. " "
25.8	"	loaded 300 lb. London-Birmingham trunk cable.

A 20 lb. cable with an equivalent of 1.05 or 5 per cent variation from standard cable has been installed at King Edward Building. This cable consists of 20½ mile drums of eight pair multiple twin, and is arranged to give 80 miles as the maximum length and any part of the 80 miles down to 1 mile. When investigating the losses due to bridging and terminal apparatus, it is advisable to conduct such tests with the apparatus connected in lines similar to those used in practice. For example, the ordinary local battery induction coil 1—25 ohm, compared with the 1—150 ohm coil, is of the order of 5 M.S.C. better when

the comparison is carried out on 20 lb. cable, but is only about 3 M.S.C. better when compared on a line made up of cable and open wire. In order to conveniently investigate such terminal reflection effects, and also other effects in the laboratory, an artificial aerial line totaling 800 miles is now being brought into use. This artificial line is made up in 100 mile boxes. The line represents both 200 lb. and 400 lb. aerial copper.

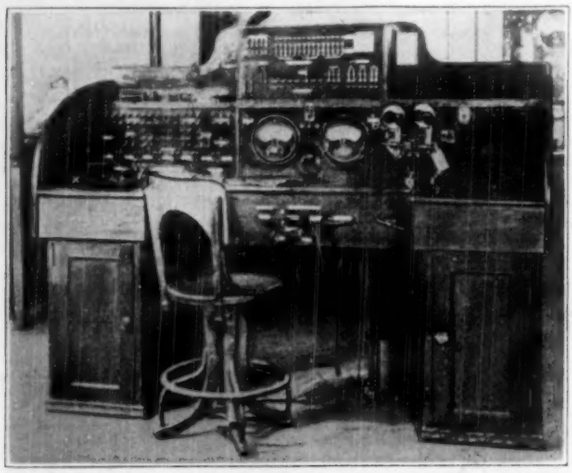


Fig. 3.—Standard Cable Measurement Desk (General View).

Artificial Aerial Line Data, Values per Loop Mile.

	200 lb.	400 lb.
R	9 ohms	4.5 ohms.
K	0.01 mfds.	
L	3.7 millihenries.	

The insulation resistance can be varied in the case of two of the boxes from the natural insulation of the ebonite top to 1, 0.5 and 0.1 megohm per loop-mile. The line inductance is reproduced by toroidal wood-core inductance coils. The capacity by condensers with mica dielectric and the leakance by hurdle wound coils of very fine wire. The electrical constants are lumped in 8 mile lengths—*i. e.*, 0.62 M.S.C.—for the 200 lb. condition, which gives a lumping factor considerably less than that commonly adopted for artificial 20 lb. cable boxes—viz., 2 M.S.C.

Only two boxes are fitted with variable leakance; the remainder are unprovided with leakances. The attenuation constants, as measured by the Francke machine, are for the 200 lb. 0.00717 and for the 400 lb. 0.00371. These results are very close to the calculated values—namely, 0.00717 for the 200 lb. and 0.00365 for the 400 lb. Having dealt with the sending, receiving and attenuating standards and apparatus, I will conclude the first part of this paper with a short description of how these standards are employed in carrying out a standard cable measurement.

TRANSMISSION TESTING DESK.

A special S. C. testing desk has been designed and installed in the department's laboratories. Fig. 3 is a general view of the front of this desk. The upper central panel contains a series of knife switches, so connected that any standard circuit can be quickly set up for testing C. B. or L. B. transmitters, receivers, induction coils, etc. The lower central panel contains ammeter and voltmeter for measuring transmitter resistance and for other purposes.

Between the two meters is a row of three lamps marked *B*,=, *W* respectively—*i. e.*, better, balance, worse. Below these lamps is a signal buzzer. The left-hand panel contains terminals for connecting up various test apparatus, and the right-hand panel contains strips of relays used in changing over from one condition to another. Half the relays are single make and the remainder single break, and the repeating coils, which are 500 ohms in resistance, are all connected parallel to be operated by 30 volts. An artificial standard cable passed as a fixed length, in circuit with the apparatus under test, is shown on the right of the desk. On the right is a handle which rotates a contact drum used to operate the relays for changing over from the standard to the apparatus under test. An adjustable swing arm on the right carries supports for a pair of carbon transmitters.

In the silence cabinet, which is used in conjunction with the testing desk, is fitted a row of mechanically retaining keys any of which, when depressed, remain so until another is operated. There is one of these keys to operate each of the three lamps marked *B*, =, *W*, on the testing desk. The observer in the cabinet has also before him a pair of lamps marked *1* and *2*, which indicate by their alternate lighting whether he is connected to the standard apparatus or the apparatus under test.

We are now in a position to consider the general method of operation. The actual standard cable measurements are mainly carried out by youths, termed transmission assistants, under the supervision of an engineer.

Assuming that transmitters are being tested, one transmission assistant sits at the desk and counts 1, 2, 3, 4, 5 alternately on a test transmitter and a standard changing over the circuit after each count. There is a fixed length of about 35 M.S.C. in circuit with both transmitters, and, in addition, a variable length in circuit with the better of the two transmitters. As the change-over switch is operated the lamps marked (1) and (2) light in the silence cabinet and the observer in the cabinet depresses one of the three keys (*B*, =, *W*), which indicates by lighting the corresponding lamp on the front of the testing

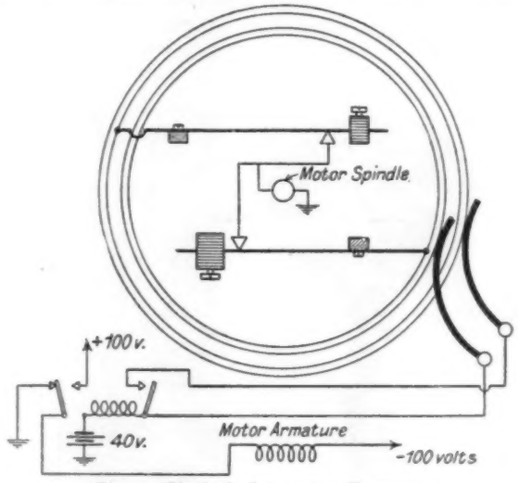


Fig. 4.—Rhythmic Interrupter Governor.

desk the relationship of condition (2) to condition (1). The key at the same time operates the buzzer on the desk momentarily. The balancing cable is then varied until cable lengths definitely indicating better and worse are determined. The mean of these is taken as the correct value. A reversing key is provided so that the test apparatus can be connected on either circuit (1) or circuit (2). It may be mentioned here that two separate 22-volt batteries are employed for feeding the standard transmission circuits at either end in order to eliminate the error due to cross-talks. The lamp signals enable the observers to concentrate on the volume balancing, and avoids the necessity for the speaker to state after each count which condition he has just spoken on. The last lamp signal, whether

better, =, or worse, remains glowing until the next signal is sent, thus preventing error.

DESCRIPTION OF A TELEPHONOMETER.

Early Experiments—An attempt was made some years ago to find a substitute for the voice and ear in

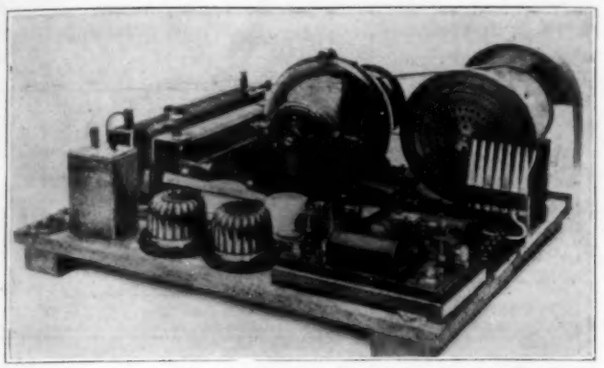


Fig. 5.—Rhythmic Interrupter (Front View).

telephonic volumetric measurements. Firstly a comparison was made of various words used in balancing lines, circuits and apparatus, and it was found that the words 1, 2, 3, 4, 5 gave substantially the same results as sentences such as "Mary had a little lamb." When this had been ascertained, a series of oscillograms was made for the words 1, 2, 3, 4, 5 as uttered by various observers, and a mean wave obtained combining all these words. An analysis of this wave gave a fundamental of comparatively small volume and 145~, and a large 6th harmonic 20 times the volume of the fundamental, in addition to many other harmonics mostly greater in volume than the fundamental.

It was hoped that a wave representing the fundamental and the 6th harmonic would give results approximating to speech. This, however, was found only to be correct when used for comparing types of lines and circuits where relative results are not much affected by frequency changes. The results with receivers and transmitters were unsatisfactory. The question was reopened some two or three years ago, and considerable progress has been made towards a solution, although it has only been possible to experiment in the intervals from other more pressing work.

Description of Apparatus of Present Under Trial as a Substitute for the Voice—When the matter was reopened it was considered that the problem could be better tackled by experimenting with a wave containing the majority of frequencies of telephonic importance rather than attempting to use a wave containing only a few frequencies. As

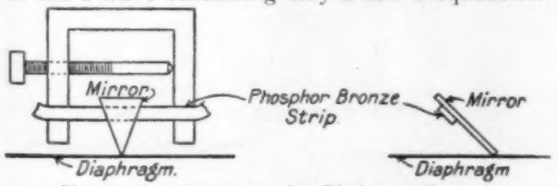


Fig. 6.—Kennelly Mirror for Diaphragm Research.

the result of considerable research the following arrangement was devised:

An interrupter is varied in speed at a regular rate so as to go through a complete cycle of frequency from to 1,400~ 700~ and back again in the space of 0.7 second. This is attained by driving the interrupter from a motor which has attached to its shaft a centrifugal governor which cuts in and out extra voltage on the armature. Fig. 4 illustrates the arrangement. A disc on the motor shaft carries two weighted contact springs connected to slip rings. One spring is lightly and the other heavily weighted, and they rest normally on a pair of contacts connected to earth through the motor spindle. The springs are connected through the slip rings to a relay and thence to earth, and the motor armature, to 100 or 200 volts, according to the relay position.

At slow speed both springs are connected to earth, the relay is energised and the armature gets 200 volts. The speed increases and the heavily weighted spring flies off its contact first, but nothing happens until the light-weighted spring breaks from earth at the top frequency of the interrupter. Then the relay is released, and as the armature is only on 100 volts the motor drops in speed. Directly the drop occurs the light-weighted spring earths again, but the relay is not affected until the heavy-weighted spring earths, when the cycle is repeated. The field of the motor has a P.D. of 200 volts across it continuously.

Fig. 5 shows the complete arrangement with motor, governor, interrupter and relay. The interrupter can supply at any speed a series of seven frequencies simultaneously. In practice the square wave from one set of studs only is used. This apparatus, which I have termed a rhythmic interrupter, supplies a wave, rhythmically varied in frequency, to a non-resonating receiver. This consists of a modified electromagnet receiver with a special diaphragm carrying a damping spring. The receiver is so adjusted that no resonance points occur between

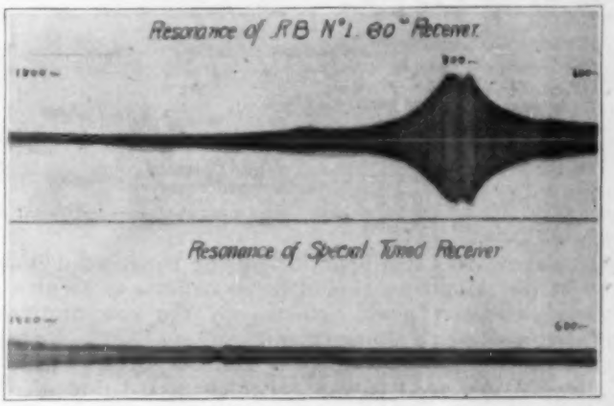


Fig. 7.—Resonance Curve.

700~ and 1,400~ (*i. e.*, the range of the interrupter). It has been found possible to use a receiver which has one resonance point in the before-mentioned range by applying a wave-smoother to the circuit as described further on. In order to test the sound output of the receivers with different frequencies, various mirror attachments to the diaphragm were tried, such as Irwin's optiphone, Duddell's mirror attachment, etc., and the best and simplest of these devices, due to Prof. Kennelly, of Harvard University, and termed by him a diaphragm exploring mirror, is illustrated in Fig. 6. The arrangement consists of a short length of phorphor-bronze strip under tension, and carrying a minute triangular mirror, the apex of which rests on the diaphragm. With the help of this device receivers have been tuned to give no resonance points over a considerable frequency range.

Fig. 7 shows firstly the resonance oscillogram of an ordinary untuned 60~ receiver. Resonance peak at about 800~. The lower curve is for the specially-tuned electromagnet receiver. Both curves cover a range of frequency from 600~ to 1,800~. A tuned receiver connected to the rhythmic interrupter as described takes the place of the human voice.

We must now consider the apparatus to take the place of the ear. This measuring apparatus must be sensitive enough to give a good reading at the end of a long cable. This apparatus gives a steady deflection when the rhythmically varying receiver is sounding into a transmitter under test, and is also extremely sensitive.

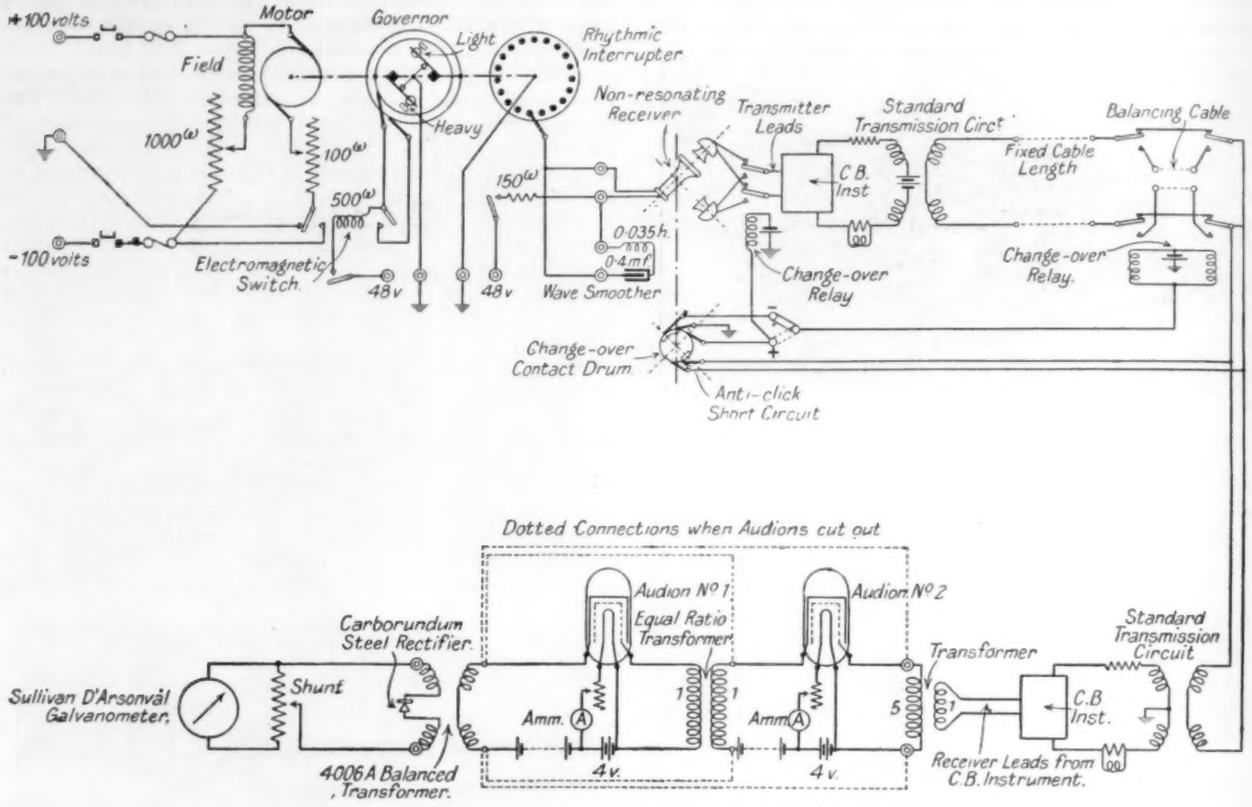
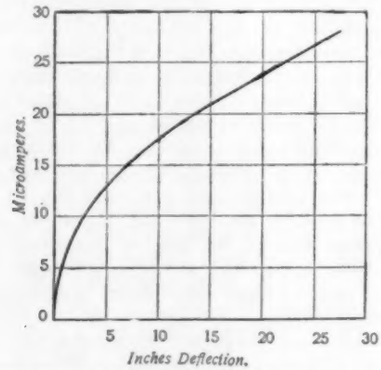


Fig. 8.—Telephonometer Circuit Arranged for C. B. Transmitter Testing.

length standard cable approaching the commercial limit, and at the same time should be so ballistic as to give a steady deflection when actuated by the comparatively slowly pulsating rhythmic current.

The arrangement adopted consists of a sensitive Sullivan-D'Arsonval galvanometer connected through its shunt to a carborundum-steel rectifier (see Fig 8). This rectifier is at the center of one winding of a balanced 1 to 1 transformer. The other winding is connected through one or more audion gas discharge relays, and thence to the high winding of a 1 to 5 step-up coil. The low side of the latter is connected to the receiving end of the standard



EPHONOMETER RECEIVING APPARATUS USING

Fig. 9.—Telephonometer Receiving Apparatus Using One Audion and Unshunted Sullivan Galvanometer. (Scale distance 5' 6".)

If the howling receiver has a resonance point, the wave smoother previously referred to is used. This consists of a variable capacity and fixed low resistance inductance bridged across the circuit. When adjusted to resonate with the particular frequency which requires reduction, it partially short-circuits the receiver at that frequency.

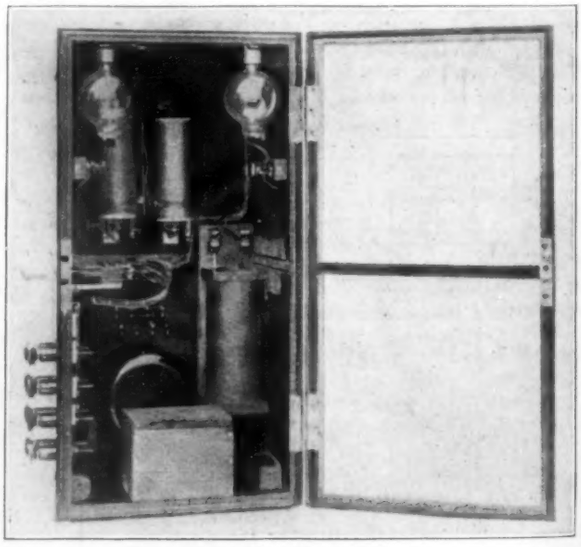


Fig. 10.

Fig. 9 is a calibration curve. The scale distance is 5 feet 6 inches, and the curve given is for the unshunted galvanometer and using one audion. It will be noticed that 20 microamperes gives about 14 in. deflection. In making actual telephonic tests an equal deflection method is used, rendering calibration unnecessary. For example, assuming a test of transmitters, if the deflection with a standard transmitter through 35 M.S.C. is 50 cm., the cable length is varied when the circuit is changed over to the transmitter under test until the deflection is again 50 cm. The cable change equated to standard is then the standard cable value for the transmitter under test.

The howling receiver is carried on a swing arm so that it can face either of the transmitters, and these are carried on adjustable arms so that the gaps between the receiver and the transmitters can be made equal. As the swing arm is rotated from one transmitter to the other it opens and closes contacts to effect the necessary change over in the circuit. Fig. 10 shows two audion relays, transformer and rectifier in case. I have termed the complete apparatus a telephonometer.

Table I gives results obtained in comparing various types of lines by standard cable measurement, telephonometer and calculation.

TABLE I.

Line under test.	Equated length in M.S.C. By speech (mean of a number of balances).	By telephonometer (single test).	By calculation from the measured A.C. constants.
20 lb. artificial cable (No. 5), mica condensers, 20 miles virtual length.....	21.4	21.2	21.2
400 lb. artificial aerial line, 200 miles virtual length, insulation resistance 1Ω per mile.....	6.7	6.4	6.3
The experimental 20 lb. cable, 8 pair multiple twin, 37 actual miles.....	35.5	35.8	35.2
40 lb. artificial cable, 32 miles virtual length	26.1	26.25	26.2
70 lb. artificial cable, 32 miles virtual length	22.0	21.9	21.95

The artificial aerial line was tested between two 20-mile lengths of standard cable in order to eliminate terminal reflection losses. The calculated value allows for the transition loss between the aerial line and the cable. As the application of the telephonometer to transmitter tests is a far more difficult problem, it is not proposed to go into any further detail regarding line tests, but to deal with transmitter testing. Table II gives the result of a number of tests of transmitters of both C. B. and L. B. types when compared by the telephonometer and also by the ordinary speech measurement.

It will be noted from this table that the agreement between the speech and telephonometer tests is striking when it is borne in mind that a variation of the order of at least 1 M.S.C. may be expected when repeating the speech tests of any C. B. transmitter, and that with inset transmitters this variation will be increased. There will also be a range of several M.S.C. with different speakers. The speech tests are the mean values for three observers, making six complete balances, and such a set of balances occupies three men for the space of one hour, or three man-hours. The telephonometer test, on the other hand, takes an observer about 5 minutes, and most of that time is occupied in connecting up the transmitter under test. Furthermore, the telephonometer is far more sensitive for small alterations in transmission volume than the S. C. measurements. A change of less than ¼ M.S.C. is readily detectable.

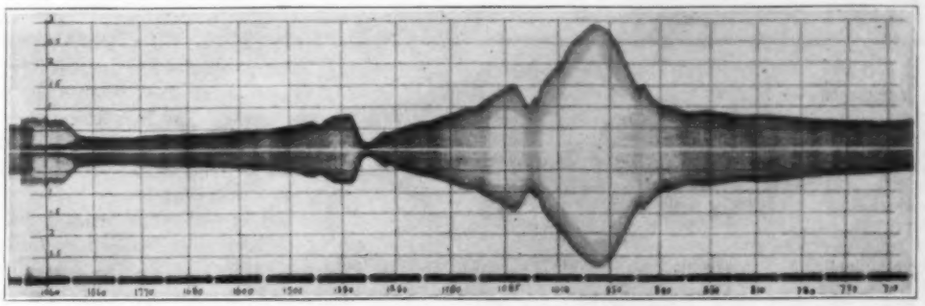


Fig. 11.—Resonance of C. B. Solid Back Transmitter.

Fig. 11 is of interest, as it shows the resonance points for an ordinary C. B. transmitter between 700 ~ and 1,900 ~. It will be noted that the main resonance point occurs at about 960 ~, and this point occurs about the same place in practically all samples of No. 1 C. B. transmitter tested. In some cases, however, this is the only resonance point, whilst the example shown has quite a number of smaller points. The method of taking this oscillogram may prove of interest. The oscillograph is a Blondel, arranged to photograph on a slowly-revolving drum covered with sensitized paper. An alternator is used to supply current to the tuned receiver which actuates the transmitter. No mouthpiece was used, and the receiver and transmitter were butted up close. The resonance frequency of the enclosed air was well above the highest frequency applied. The alternator was brought to the maximum frequency and then the driving motor shut off, so that the frequency rapidly fell and at the same time the recording drum was started. A second oscillograph vibrator was used to record frequency and paper speed. The gaps occur every 1.23 seconds and the fine lines every 106 cycles of the alternator.

TABLE II.

Transmitters under test.	Relative transmission efficiencies. By speech (S) M.S.C. 3 observers, 6 balance tests.	By telephonometer (T) M.S.C.	Difference S−T M.S.C.
R. B. 1, C. B., solid backs, all compared against C. B. standards—			
a	+ 1.3	+ 1.9	−0.6
b	− 2.1	− 2.0	−0.1
c	− 08.	− 0.7	−0.1
d	− 3.5	− 3.0	−0.5
e	− 1.6	− 1.0	−0.6
f	− 4.0	− 4.0	0
g	− 2.0	− 2.5	+0.5
h	− 1.5	− 1.5	0
Inset transmitters, all compared against C. B. standards—			
k	− 9.0	−10.7	−1.7
l	− 9.0	− 9.2	−0.2
m	− 9.3	− 7.7	+1.6
n	− 9.6	− 9.2	+0.4
o	− 9.8	− 8.2	+1.6
p	− 7.9	− 6.7	+1.2
q	− 9.8	− 8.9	+0.9
r	−10.3	−12.9	−2.6
s	−13.5	−14.2	−0.7
t	− 9.8	− 9.2	+0.6
u	− 8.9	− 6.8	+2.1
v	−11.3	−10.2	+1.1

+ signifies better and − worse than the V. O. standards.

Overcoming Wildcat Competition

One Kind of Business Piracy and What Can Be Done About It

(*Copyright, July, 1916, by Elton J. Buckley.*)

THE question asked by the letter which I am reproducing below may arise in anybody's experience at any time. Therefore I discuss it here instead of sending a personal answer, withholding the writer's name and address as he requests:

We present below a situation on which your opinion is desired.

A, a patentee, is manufacturing and selling, through the jobbing trade, a device on which he has spent several years' time and considerable money in creating a demand and building up a business to the point of reasonable profit. He now has a line of jobber customers covering practically the entire field in which the device may be sold. This field, however, is limited and the article a "short season" one and A can easily supply the entire demand, which makes a fairly good business for one firm.

At this point B enters the field, copies A's device, makes it with less care and less taste and goes after A's customers, offering to supply them at a lower price, and is meeting with some success, to the serious injury of A's business. As B's device looks exactly like A's, it is, of course, being sold solely on the reputation of A's product. As no change in illustration is necessary, the same cuts which the jobbers used for A's device (electrotypes for which were furnished by A) are being used in some instances, at least, for the sale of B's.

A notified B that he was infringing his patent. B replied in a rather defiant manner, but on being threatened with a suit, promised to discontinue the manufacture of the alleged infringing device. After one year A discovers that B continued the sale of the device in question, and in the meantime, with the assistance of a patent attorney, has devised certain minor and unimportant changes in the structure in an effort to avoid the claims of A's patent. B now cheerfully informs A that his patent attorney advises that the device as now constructed avoids the claims of A's patent. These slight changes have apparently been made with a view of retaining the essential features and general likeness to A's device in order, as seems evident, that it may pass in the trade as substantially the same thing. The same cut or illustration will still answer for both.

One of the slight changes which B made seriously impairs the efficiency of the device, but this change cannot be determined with the eye, nor can the user determine the cause of the inefficiency without considerable intelligent study of the mechanical construction. Now, if B is permitted to continue in his course his device will still pass in the market as substantially A's product, and the sales made will be solely on the reputation of A's device. Thus B is not only practicing a deception on the trade and the consumer, but this deception will, as a matter of course, eventually affect the reputation of A's device.

As a last resort A will certainly bring suit for infringement, as his patent attorney believes the changes in structure are "colorable" only and do not depart from the spirit of the invention.

We have gone into this in detail because there seems to be other questions involved than those of technical patent law, and on which your opinion is desired, viz.:

In the meantime, what may A do to combat this competitor, if such he may be called, and to prevent the ruin of his business before the final termination of a suit? What may A say to his customers, whom B is endeavoring to draw away, in regard to this bold invasion of his rights? What may he say of the deception in B's device?

Your recent articles would seem to indicate that it might be unsafe for A to do or say anything other than bring a suit, and even in this event, should he fail to sustain the charges, he might be subjected to a suit for damages in return. Personally, we believe in a case like the above the law would permit or give A considerable latitude in combating such a bold invader.

The question is, what can A do to save his business here? Is he helpless? Must he await the long and uncertain process of the courts, with B meanwhile going ahead and stealing his trade, or is there some quick and effective method by which he can settle the matter, or at least prevent B from doing any more harm until it is settled?

As bearing upon the lengths to which competition can legally go, the question is interesting.

What I should do if I were A, and were confronted by wildcat competition of this sort, is this:—

I should *at once* institute suit against B in the United States Courts of his district. This will not be cheap or easy, but it will probably be worth all it costs. I should ask for a preliminary injunction against him on the two-fold ground that he is infringing upon my patent, and that he is guilty of unfair competition. From the above statement of facts, there is plenty of ground for an injunction, which if the court grants it, will peremptorily stop B, and indirectly all of his customers, from selling B's device until the suit is decided. My judgment is that the court would very likely grant it, under the circumstances above, if they can be proven.

Unfair competition, which may exist even if there is no infringement of patent, lies in the attempt B is evidently making to get the benefit of A's work—to palm off his own device as A's.

A will either get a preliminary injunction or he will not. If he is refused it, he may still get a permanent injunction, when the case comes on for final hearing, which will not be however, for several weeks. He will get the preliminary injunction, if at all, in a few days.

Whether he gets the preliminary injunction or not, the next step ought to be to go straight to every customer with a fair story of the controversy. If he has the injunction he can of course say he has it. If he hasn't it yet he can say he has applied for it. And he can state the facts of the dispute, fully and fairly. A United States Court, in a case recently decided in Indiana, enjoined the defendant from sending notices to the trade accusing a competitive article of being an infringement, the evident object being to destroy the competitor's trade. This decision does not go so far, however, as to forbid every merchant or manufacturer who considers himself aggrieved and who is obliged to go to law to redress his wrongs, from telling his customers about it. On the contrary, he can undoubtedly tell them with perfect legality about it. Any man who is facing competition of this sort, which he believes to be in a sense fraudulent, can go straight to his trade and state his side. He can do it by word of mouth, or by letter, or by advertising, or in any other way, and no action for damages can successfully be brought against him—*if what he says is true and is said in good faith.* That is the only chance he takes—he may be compelled to prove the truth of what he said, and its good faith. If he can, he is safe.

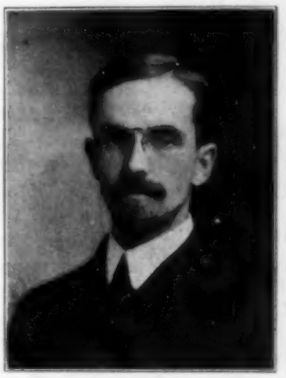
It seems reasonably clear, if B has a preliminary injunction granted against him, and the trade is then completely covered by A's statement, that a crimp will be put in B's business which will practically eliminate him. And if A's statement is true, very properly. There is no remedy so speedy and effective as the injunction in cases where competitors are either infringing on some patent or trademark right, or are indulging in unfair competition. Through an injunction the United States Government reaches out its hand and seizes by the throat the business man who has not been willing to play the game fairly. It is expensive, but if you have good grounds for it, you will always find that it pays.

Foreign Trade

A Paper Prepared for the Convention of the Southern States Independent Telephone Association

BY FRANK W. PARDEE

THE subject of "Foreign Trade" would seem to be a most difficult one in which to interest men engaged as you are in strictly local and domestic development. Problems of financing the rebuilding of lines, of fighting the common enemy, the octopus, of engineering and of serving your patrons to their satisfaction and your profit (maybe) are questions that are nearest to your hearts and that elicit a quick and sympathetic interest in your minds, but when we substitute the topic of "corn" for "pole lines" and a native of Timbuctoo for your subscriber Jones, your interest is naturally apt to lag and your attention to wander—at once the human element is removed.



Frank W. Pardee.

Were it not for the fact that you are all broad-minded men of affairs, (for you would not be successes in operating public utilities if you were not) and that you are keen to learn and know more on all subjects that affect the interests of your fellow Americans, the effort would be hopeless. Possibly it will be well, in any event, to confine these remarks to the features in connection with foreign trade which are touched on infrequently and which, though small in themselves, lend more of the human element to an otherwise dry and rather statistical subject.

The government publishes volumes innumerable on export figures, favorable balance of trade, rates of exchange, etc., but you are seldom told that it is dangerous to ask a citizen of Argentine for a reference as to his credit—that is if you hope to get his order.

Of course, that remark is not literally true, but it will serve to illustrate and emphasize one radical difference between our methods of doing business here in America—or indeed with all English speaking nations—and the methods in vogue in countries speaking another tongue. This particular difference might be all summed up in the one word "politeness." Not only in questions effecting credit, but in the very manner of wording the most common business expressions, punctilius care must be exercised to be what we would consider unnecessarily polite. Our blunt English way of saying exactly what we mean may spell failure for the inexperienced merchant or manufacturer who attempts to gain new trade in foreign fields. And on such small details may depend the success or failure of an expensive sales campaign.

There is no real mystery to foreign trade, but there is need of even more careful study and thought and effort than the average American business man puts into his domestic policies and methods. The language and customs of the foreign country must be considered. For example, you must know the language of Brazil is Portuguese—not Spanish, as most of us instinctively think. While the average Brazilian reads and understands Spanish, his pride is touched if your letters to him are not written in Portuguese. It is one of those delicately polite bits of thoughtfulness and courtesy that appeal more forcibly to the Latin races than they do to us. At the same time he will accept, without objection, your Spanish catalogue, for he realizes that that language covers many countries—and that good printed matter is too expensive to publish in every tongue. And right here it is interesting to note that if you are *buying* you may use any old kind of language, but when you are trying to *sell* you must spend money to have your letters translated into your prospective customer's tongue. It's quite a different matter.

To revert for a moment to the subject of credits. Mention has been made of the supersensitiveness of the South American, for example, on the subject of references. He knows you are right in demanding them, he realizes the necessity of establishing credit with new sources of supply, but "gosh, how he dreads" your mentioning it. In no branch of correspondence must your circumlocution be more circuitous, your diplomacy more tactful. You may quote a $50.00 order in ten words, but you must apologetically explain in several reams how stupid you are not to know that his credit is triple A1, deprecatingly remarking your own ignorance in comparison with his obviously greater knowledge of your own worth, as evidenced by his touching confidence in your (of course) unquestioned ability to faithfully and satisfactorily perform his bidding. If you are wise (meaning "hep to the game") you add your own references (preferably banking) for if the truth be told he is more suspicious of the Yankee merchant than you are of him. At the same time your frankness in giving your references suggests to him that he reciprocate which he cheerfully does if he is worthy of confidence.

Great caution must be exercised in passing on foreign credits, even though it entails as it necessarily does long delays in the filling of orders, and sometimes the necessary information is difficult to secure, for the sources are not so easy of access—not so systematic as our own. Bank references are the most common and generally the most reliable. The word "generally" is used advisedly for you must be careful to use if possible a "neutral bank" in securing reports on a customer. Fortunately one American bank, at least, is fast establishing branches all over the world—the first attempt of American bankers to really assist American business men in a vitally important feature of foreign trade. It is important because, as you probably know, most banks in foreign countries are under English or German control and the methods of assistance given by such banks to their countrymen are surprisingly patriotic to say the least. Ask one of these banks for a report on a firm of prominence in their city and you will eventually get an answer, which may or may not be strictly true, but long before your report is received a competitor in England or Germany has been apprised of the fact that an American concern is after that firm's business and a representative of the competitor is on the ground with cut prices and long terms.

An amusing illustration of the need of thorough investigation of foreign credits is the case of the man in an interior town in Brazil who artlessly asked for the

agency for the whole of South America, explaining in glowing and glittering generalities the tremendous possibilities for trade in that particular line. Banking and credit reports, when received, showed him to be an assistant to the village barber, without capital, without experience, in short no asset but a vivid imagination. Yet some American manufacturers have given their exclusive agency to just such men, tying their own hands for a year or more and then complained that foreign trade was a fake and that they were firm in the belief that "there ain't no such animal."

America has too long been content to be self-contained and now finds it desperately hard to compete abroad with the thoroughly entrenched and better informed European. Of course the war has brought much new business to us, but the problem is how to hold it afterwards, to establish our quality and our prices (and our terms, if possible) so that we may continue to secure our share of the world's markets. What the outcome will be we cannot foretell but it behooves every American who would sell abroad to look well to the little details, for only by such care can he hope to permanently oust or share with the European house which has supplied material and capital, assistance and friendship and, most important of all, reciprocal business for years—literally, almost centuries.

We have a difficult task too in living down our past reputation—for you mustn't flatter yourselves that other nations think as much of us as we think of ourselves. They haven't forgotten the wooden nutmegs we sold them sixty years or so ago—nor the paper shoes more recently—nor the embalmed beef. In many countries—possibly in most—we are considered a nation of bluffers—of fakers—of substituters of the "just as good" for the "real thing." Too many of our manufacturers have sent 22 karat samples and filled the subsequent orders with brass plated tin. And the foreign buyer doesn't forget. So you can see why reciprocity is necessary in references as well as in trade—and why it is slow, hard work to get back the trade lost with the last of our "clipper" ships.

By the time we succeed in convincing them of the reality of our reform the war will be over—and what then? Only the Kaiser knows and he's too busy to tell. We can only hazard it logically but inconclusively for the truth is nobody knows.

One theory is that the loss of life and the maiming of expert men in Europe will cause a shortage of skilled labor—that wages will therefore be high and that American manufacturers with their highly paid labor, will still be able to compete.

Another guess is that the sudden cessation of the war will throw millions of men back into industry, which will be unprepared to use them, for all this tremendous dislocation and demoralization cannot instantly be overcome and labor will therefore be unemployed, which means starvation wages, low costs and impossible competition for us. Female labor adds another factor to the uncertainty and obviously this must be considered, for women are now doing, and can doubtless continue to successfully do, much of the work formerly done by men. While they may now demand the rates paid men, the over-supply after the war will doubtless tend to greatly reduce their wages and hence to lower costs. Unfortunately these arguments appear painfully plausible, but the possibility of the economic exhaustion of the combatant countries is a factor which can—and may—vitally effect the final results.

It is plain that if, as a nation, we wish to secure and retain foreign trade we must do several things:

1. Supplant Europe in financing those countries whose capital has heretofore come from Europe.
2. Implant "dollar exchange"—which means branch banks in every country.
3. Study the customs and demands of our prospective customers and arrange to supply *exactly* what they want—not what *we* want to furnish, as in the past.
4. Extend, so far as our ability permits, the same long terms to which that trade is accustomed (and in this our banks must assist).
5. Furnish honest merchandise at fair prices.
6. Buy all we can from the nations with whom we would trade.
7. Co-operate—merchants, bankers, manufacturers, government—*all*, for we are combating beautifully organized and co-operative opposition.
8. Look to our merchant marine—for we are today paying England a shipping toll which in peace times will put our manufacturers and producers out of the running—which will be absolutely prohibitive under normal conditions.

Your cotton will have to compete with Egypt's, your corn with Argentina's, your wheat with Canada's, and you will pay more than your profit in freights to foreign ship owners, unless we, as a nation, wake up and build our own ships to compete with the shipping which offers our foreign competitors a favoring freight rate of 30 per cent to 70 per cent. At present our shipping is also suffering from a serious shortage in bottoms and you may be quite sure that our competitors who can still compete are being favored in this matter of service, as well as rates.

As usual we must watch both ends to make them meet, and we must care for both ends, like the minister in the New England town which boasted two churches of the same denomination, but only one minister. For identification these churches were called "North End" and "South End." At the close of the sermon the minister announced "Services will be held next Sunday morning at the North End and in the afternoon at South End. Infants will be baptized at both ends."

Of course, our so-called war orders have been enormous, but they will soon cease and in any event they offer no permanent trade or prosperity to the nation. Before the war we were far from holding our own in foreign trade. From now on we must go ahead or count ourselves definitely out of it—holding our own is *not* progress. President Wilson is credited with a story (and right now a little credit may be welcomed) about two men who set out to drive to Uniontown. At the first cross roads, after driving an hour, they stopped a farmer and asked how far it was to Uniontown. He replied, "It's just seventeen miles." They drove for another hour and asked another farmer who, after ruminatively figuring for a minute, answered, "Wal, sir, it's just exactly seventeen miles." A bit discouraged, but still hopeful, they continued on their way, but after two hours more, being somewhat wearied and seeing no town, they stopped a third countryman and again asked "How far is it to Uniontown?" Imagine their disgust when he said, "Uniontown? Why yes—it's just seventeen miles from here." Whereupon the driver turned to his companion and exclaimed, "Well, thank the Lord, Bill, at least we are holding our own."

We are fortunate in having some very real, efficient

and effective co-operation from our government. The Bureau of Foreign and Domestic Commerce, under the direction of Dr. E. E. Pratt, is giving information and assistance of every possible sort in so able a manner that it has been commended by many foreigners as the most comprehensive and thorough work of its kind given by any government to its people. This bureau issues a daily report that tells of trade possibilities and prospects from every corner of the earth, puts sellers in touch with buyers, remarks changes in duties and other foreign governmental regulations, comments on conditions of trade, crops, finances, etc., in every imaginable section of civilization and class of trade. The bureau has accomplished many large and important bits of work—as for example, the negotiation of a treaty which has resulted in the establishment of a new industry in this country—the refining of tin—an industry which will not only add $100,000,000 annually to our volume of business but, possibly more important, make us a powerful factor in the world's market for that product and independent of those who formerly controlled it. When you learn that the United States consumes at least 50 per cent of the world's output of tin you will appreciate the desirability of doing the smelting and refining here. Incidentally in arranging this stupendous enterprise, the bureau practically forced the development of a brand new method for doing the smelting—electrolytic—negotiated a commercial treaty with one of our South American sister republics, which will eventually mean more trade for us from that country and secured us against foreign control of a very necessary basic product. Our experiences, since the war began, in dyes, chemicals and many other lines illustrate forcibly the desirability of controlling our own sources of supply.

The bureau also, through one of its representatives, recently prevailed on Spain to remove its transport tax on coal, since which time we have sold millions of tons there and opened a new market for an old product. Doubtless the bureau is doing all that can be done to help your cotton growers and distributors. Unfortunately, efficient and resourceful though it is, it has not yet found a way to raise prices, but even this may come in time. We have good reason to be proud of and grateful to one department of our government at least, which is admittedly superior to that of any other country.

Reference has been made only to manufacturers and producers generally as being interested in export trade, but of course our farmers, cotton growers, miners, lumbermen and other industries may properly come under the head of producers, so that these remarks are intended to apply to them as well as to actual "manufacturers" of goods or actual "merchants," in the generally accepted meaning of the term. If we, with our well known American energy, go after this foreign business as we have gone after other things we wanted, in the world's history, there is no reason why we should not succeed. We must go after it as though we wanted it—as though we intended to get it—and keep it.

Telephone on Irrigation Systems

Direct telephone connection with all parts of irrigation systems is coming to be recognized as a necessity. This is essential both for routine distribution of water on large systems and also for emergency use at time of accidents to the canal. On the projects of the United States Reclamation Service over 2500 miles of telephone line are in use. The average cost of this, including telephones, has been $160 per mile. On the different projects the acres served per mile of telephone varies from 300 to 1500, being smallest on those systems having long diversion canals, and largest for the more compact projects. The average for the operating projects is one mile of telephone line to about 700 acres.

Bones Used for Transmission

Dr. J. Glover, a French physician, has devised an apparatus for internal diagnosis by which sound waves given out by human organs may be propagated either through the air in the ordinary manner of sound waves or through the bones and tissues of bodies, according to Jacques Boyer in the *Scientific American*. By means of the apparatus, it is said the practitioner will be afforded the possibility of an early diagnosis of tuberculosis, and a close study of respiratory organs is also practicable.

Describing Dr. Glover's apparatus, the *Scientific American* says:

He places a galvanometer in circuit with a microphone, an induction spool primary and a voltaic battery. A voltmeter is attached to measure the electro motive force at the moment of experiment. For a given position of the microphone this apparatus develops a certain intensity, which is indicated by the index of the galvanometer. When the microphone is exposed to the action of the organic sound vibrations from heart, lungs, etc., its membrane is subjected to periodic deformations, which are revealed to the eye of the observer by the galvanometer hand, the quotient of the voltage of the electric scource by the resistance of the microphone circuit being kept constant.

In order to test and check the visual record thus obtained of the patient's internal mechanism Dr. Glover has devised a system of two receivers inserted in the secondary coil of the induction spool. This is approximately used in examining respiration and heart action. It is to be noted also that the galvanometer test is of value when associated with ordinary feeling of the pulse; for it reveals delicacies of the vascular vibrations which would not be sensible to the organs of touch.

Court Gets Chicago Telephone Fight

The fight of the Public Ownership League to prevent the Chicago Telephone Company and the American Telephone and Telegraph Company, the parent corporation, from acquiring the Chicago automatic telephone property under the recent $63,000,000 deal took a new turn by the filing of an appeal in the Sangamon county Circuit court at Springfield. The appeal is against the recent ruling of the state public utilities commission approving the sale.

Attorney Fayette S. Munro, counsel for the intervening petitioners, said he expected the case eventually will be taken to the Illinois Supreme court.

"The sale of the automatic is a part of the big scheme of the Bell interests to monopolize the telephone business of the entire country," said Attorney Munro. "The Public Ownership League will fight it to the last ditch."

Mr. Munro called attention to the existing agreement between the attorney-general of the United States and the Bell interests by which the telephone corporation bound itself not to acquire any new competing telephone property without the affirmative consent of the federal department of justice.

The Appreciation of Service

Paper Read Before the Operators' Meeting, Sixth District Telephone Convention, Sedalia, Mo.

BY MRS. LULA ANDERSON

LAST year the Sixth District Missouri convention was held in Higginsville, and our manager invited all the operators along, to make the convention a joint meeting between manager and operator. Going to telephone conventions was something new to all of us; meeting everyone from the smaller towns all around us made it quite different from the Ladies' Aid Society, which was the only meeting most of us had ever attended. The men did the talking and the ladies listened, but they warned us that they did not intend to do all the talking at the next meeting; and as the one great issue of the day is preparedness, we can say that we are, in a measure, prepared. However, our efforts may seem still in their infancy, for we have not been attending conventions long enough to know exactly how to tell much about what we do and what we know.

I am glad that I can be with you again this year, and the only regret is that we had to leave ten other operators at home. I am sure every one of them would have been benefited by this meeting. If conventions are helping the men better their part of telephone work I am sure they will also help an operator, especially the one who has no opportunity to learn anything about her work save what she picks up in her own small office. I am sure every operator desires to be more efficient, and while it is impossible for all the operators to attend conventions and get new ideas, we who are fortunate enough to attend must watch and listen and learn just as much as we can, for our part is to go home and tell the other girls what can be done to better the service.

The operator, possibly more than any other employe of the company, should feel a personal interest in the company and her work, for it is she who comes into direct contact with the subscriber and it is through the operator that a company is first judged. So often it is the case that a little thing, said in a short, snappy voice, sounds like a positive insult to an irate subscriber. He may say a few words to the operator, but he saves most of his wrath until he meets the manager, and then the things he says would not look well on paper. The manager possibly knows nothing whatever of the incident, but is blamed just the same. I am sure no operator wants another person to suffer for her mistakes, yet in this case that is what happened. Now, if the operator had spoken in a pleasant tone, had explained that the ring in his ear had been accidental, had taken a little time to apologize, to make him feel that she had a personal interest in his call, the chances are that the next time he met the manager, he would have given him a friendly hand-shake, assuring him that his service was fine, and his operators the best in the world.

I can cite a little incident in my own experience. A few mornings ago we were unusually busy and it seems that a farmer had to ring more than once to get Central. As soon as I could, I answered him, and he asked very crossly, "Don't I ring in, Central?" I replied, as it happened in a very pleasant tone, "Yes, Mr. Jones, and so do a hundred others." I forgot all about the incident until a few days ago, when I was talking to a friend, and she told me about Mr. Jones having told her about calling Central and speaking so cross, and when she answered him as she did, he realized how busy she probably was, so that he hung up his receiver and went out and shoveled snow, making a vow that he never would be so cross to Central again.

I have a great deal of experience on the farmer board, and I am one of the few operators who really like that board. One of the greatest drawbacks to good rural service is the long conversations on party lines. I have known people to hold a line an hour on one conversation, and I think there are occasions where Central is justified in exercising some authority, where parties refuse to give up the line.

One day I had a call from a subscriber who wanted to talk to his home in the country. I had a connection on the line, and reported so to him. In about ten minutes he called again. The line was still busy. He was very anxious for the line, and as these people had exceeded the five minute limit allowed on party lines, I asked them for the line. They replied that they paid for their service and expected to use it. I waited a few more minutes, thinking they would surely stop, but as they kept on talking, I took down the connection, and then rang my party. I am glad to say, however, that we have very few such subscribers. We have many who hold long conversations, but most of them are perfectly willing to give up the line when Central asks for it. At the same time, most operators dislike to ask for a line, and often report busy lines, where if all on the lines would respect the five-minute conversation rule, much better service could be given.

It is my opinion that no class of subscribers appreciate good service like the farmer. On New Year's morning a great many of them called me, wished me a Happy New Year, and thanked me for a year's good service. Now perhaps on the same line, another farmer would say we give him bad service. That is strange, too, isn't it, for when a farmer line rings in Central does not know which one is calling. The only explanation to this is the fact that people are different, and some are much harder to please than others. So we can only do our best, but let us be sure that it is our best. Watch the drops closely. Keep the drops on the board. Several drops down at once is confusing to an operator. Go in on the connections often. Don't depend too much on ring-offs. Sometimes people don't ring off, and sometimes the drops don't work, and a farmer living ten or fifteen miles from town and a mile from a neighbor cannot go to the next door and tell Central to answer him.

Let us, each and every operator here, work together and make 1916 a banner year in telephone service. Let us give our company the very best we can, think as much of the company's dollar as our own, and above all things keep in mind, "Better Service."

Joint pole construction is now employed at Portland, Oregon, by the Portland Railway, Light & Power Company, the Northwestern Electric Company, the Pacific Telephone & Telegraph Company and the Home Telephone Company; 3071 telephone and power wire poles are now controlled jointly.

Wireless Communication of Speech

Read Before the Students' Section, Institution Electrical Engineers

BY PHILIP R. COURSEY

IF WE take an ordinary continuous-current arc, and, while maintaining the arc length constant, we vary the current passing through it, and at the same time measure the p.d. between its terminals, we obtain what is called the characteristic of the arc. In the case of all ordinary arc discharges this characteristic is what is called a "falling" or "negative" one, that is to say, when the current is increased the voltage falls, and *vice versa*. Hence, if we connect across such an arc an oscillation circuit containing a condenser, there will be a sudden rush of current into the condenser tending to charge it; this current rush will momentarily cause a decrease in the arc current, with, as a result, a corresponding rise of the p.d. across the arc terminals. This voltage rise tends to further charge the condenser to a voltage *above* the normal running voltage of the arc. It then begins to discharge, and this discharge current is in the same direction through the arc as the supply current, and hence causes a fall in the arc p.d. by reason of the increased current. This further facilitiates the condenser discharge. As the condenser completes its discharge, the arc current falls and the p.d. rises again to its normal value, when the cycle is repeated over again and continues indefinitely as long as the supply is maintained, and the arc retained of a constant length.

Hence the condenser will be continuously charged and discharged, at regular intervals depending on the inductance in the circuit, the capacity of the condenser, and the length and other conditions of the arc; in other words, continuous oscillations will be set up in the circuit by virtue of this action of the arc.

It follows from considerations of the arc characteristics that we require an arc which has a very steep characteristic in order to produce oscillations of wireless frequencies with any degree of readiness. By inspection of the characteristics, we see that they become much steeper for small arc currents, while at the same time for a given current a longer arc at higher voltage has a steeper characteristic, and hence in general low-current arcs oscillate better than heavy current arcs.

As a rough guide for experimental purposes it will generally be found necessary to limit the supply of current value to not more than about 2 or 3 amperes when employing arcs in air between ordinary solid arc lamp carbons, if it is desired to generate oscillations approaching wireless frequencies. With lower frequencies the supply currents may be increased. The arc length must also be kept very short. On the other hand, if very high frequencies are desired for experimental purposes it will be generally found advantagous to employ special carbons for the arcs. Some grades of graphite rods are very suitable for this purpose; while the employment of compressed air or other gases round the arc often leads to considerable advantages from the point of view of steadiness of the oscillations that are produced, as well as their intensity. The ratio of the capacity to the inductance in the oscillation circuit is also very important; a rough guide to begin with may be taken as ratio of inductance to capacity= about 100, when both are measured in absolute units (centimeters). This figure is, however, liable to very considerable variations to obtain the best effects, depending on the arc employed, on the supply voltage, and current, and more especially on the gas surrounding the arc. The use of suitable choking inductance in the supply circuit to the arc is also important to the secure more vigorous oscillations by confining them to the oscillation circuit and preventing them going back on to the supply mains.

It has been suggested that the use of the powerful magnetic fields customary in the Poulsen apparatus, has a greater utility than that of causing a mere steadying of the arc; and that the strong field really causes vibrations or oscillations to be set up in the arc, after the manner of arc interrupters, the arc being actually blown out by the magnetic field in some cases, and then automatically restruck again by reason of the applied voltage being sufficient to jump the small ionized space between the electrodes. Some such action as this may possibly take place in the Poulsen apparatus. F. Mercer, in a paper recently read before the Physical Society of London on this subject, came to the following conclusions:

1. There is a definite value of inductance for any given capacity which gives a maximum current in the shunt circuit. 2. The effect of increasing the gas pressure becomes more marked as the electric pressure is increased, but as the gas pressure rises the steadiness of the arc diminishes. The effect is somewhat similar to that obtained by increasing the arc length. 3. Any effort made to increase the output by the use of a magnetic field, or by altering the arc length, or the resistance in series with the arc, is detrimental to the steadiness of operation. These conclusions were of necessity obtained from experiments on copper carbon arcs, and they do not apply to any and every type of arc oscillation generator without modification.

Dr. Fleming's "Oil-Arc"—In the oil-arc a number of arcs between carbon and copper electrodes (copper positive) are struck just over the surface of a heavy oil. The heat generated by the arcs causes vaporization of the oil, and consequently an atmosphere of hydrocarbon vapor is created round the arcs. No magnetic field is employed, and the oil generally provides sufficient cooling, without having to resort to water cooling, but a water circulation through the oil may be provided if desired. The arrangement has been constructed for powers up to a maximum of about 2 kw.; but it is probable that modifications would have to be introduced to enable it to be available for much high powers. In connection with the operation of arcs of this type, *i. e.*, copper carbon arcs, it is interesting to note that it is not essential that the copper electrode should be positive and the carbon negative, as is usually supposed, and as is customarily the case, for example, with the Poulsen arcs, as advantages are often found in using the reverse connection. This is often more especially the case when difficulty has been experienced in starting up the arc and obtaining stable oscillations. Under these conditions a reversal of polarity will frequently cause strong oscillations to be set up, which persist when the polarity is again reversed back to the normal direction.

When an arc is running in air there is always a burning away of the carbons; if, however, the arc is placed in an atmosphere which is rich in carbon (hydro-carbon gases), the gas will be decomposed by the heat of the

discharge, and carbon deposited on the arc electrodes. It is thus possible to have an arc in which the carbons "grow" instead of wearing away when in use.

The Colin-Jeance Arc Generator—This is, in the main, very similar to the Poulsen apparatus, consisting of three copper-carbon arc connected in series, and burning in an atmosphere composed of a mixture of acetylene and hydrogen in such proportion that that normal wear or three copper-carbon arcs connected in series, and burntion of carbon from the gaseous atmosphere. The mixture of gases may be conveniently generated from a mixture of calcium carbide and calcium hydride, and the usual voltage necessary varies between 500 and 750 volts.

The author refers to the use in this case of an intermediate circuit tuned to the oscillation frequency. He points out that the frequency in the shunt circuit does not depend merely on the values of capacity or inductance in that circuit but also on arc length. This is on account of the resistance of the arcs not being negligible.

To meet this case, a formula has been devised by G. Nasmyth and is as follows:

$$n=\frac{1}{2\pi}\sqrt{\left\{\frac{1}{LC}-\frac{\{R-(C+ld)/A\}^2}{4L^2}\right\}}$$

where n is the frequency, L is the inductance in henrys, C is the capacity in farads, R is the resistance in the oscillation circuit in ohms, A is the current through the arc, l is the length of the arc, and c and d are constants depending on the nature of the arc electrodes, and on the nature of the gas surrounding the arc.

Hence it is evident that quite small changes in the arc length, supply current, etc., will produce changes in the frequency of the oscillations. This variable frequency is a great drawback to most arc transmitters.

Short Spark Methods of Generating Oscillations—The action of the so-called "quenched" spark-gaps depends on ionization, and if very rapidly worked they would be suitable for telephony.

Spark-gaps of this kind form the basis of the Lepel, Telefunken, Peukert and other patents, and are based on the results of experiments of M. Wein on the quenching effect of short spark-gaps.

The Lepel Gap—This consists essentially of two metallis discs, separated by a paper ring which, placed with their faces very close together, form the electrodes of the spark, and which are often made to form the ends of shallow boxes to enable water cooling to be employed to remove the heat of the discharge.

When in operation the gap should be connected in series with suitable choking inductances and resistances to limit the flow of current from the supply mains, and also to determine and regulate the spark frequency.

A spark frequency of the order of 10,000 per second or more can usually be obtained, and the discharge that takes place in the gap is often described as an arc.

The Marconi Disc Discharger for Generating Undamped Waves—The arrangement of apparatus is very much that of the usual Marconi studded disc discharger fed from direct current. In this instance, however, the spark frequency is arranged to be much higher than the usual, and at the same time a number of such discs are arranged on the same shaft, with their studs or contacts so displaced relatively to one another that the sparks will occur on successive discs at regular intervals during the spaces of the first disc. Each disc is preferably arranged to discharge through its own condenser and oscillation circuit, independent of the others, the effects of them all being summed up in a secondary circuit connected to the aerial in the usual manner. If, now, we so arrange the oscillation frequency of each circuit that one complete wave (or at the most two) of current takes place in the interval between the spark on one disc and the next spark on the next disc, the effect of the second spark will reinforce that due to the first, and the oscillations will be maintained. If the sparks take place every complete wave, the oscillations will be to all intents and purposes undamped, but if every second wave, there will be a slight diminution of amplitude every alternate wave —much as may probably be the case with some of the short spark dischargers described above. Such an arrangement should be capable of dealing with considerable power if properly designed, while the oscillations produced would be eminently suited for wireless telephony. The system, in fact, amounts to an attempt to accomplish in a regular mechanical manner what happens in effect in some of the short quenched spark dischargers—*i. e.*, to insure that each fresh impulse due to the passage of a spark shall exactly synchronize with the existing oscillations in the circuit. To a considerable extent this occurs automatically in the short-spark methods by reason of the reactions which take place between the currents in the various circuits; but, nevertheless, some iregularities will generally occur. The great objection to the mechanical method apart from the difficulties of the high speeds required for the discs is the difficulty of maintaining the discs running at a perfectly definite and constant speed. This is essential if the method is to work properly in order that the successive impulses shall synchronize properly with one another. It renders imperative some very sensitive form of speed governor that will maintain the discs running at a constant speed.

Frequency Multipliers.—The most important representatives of this class are the transformer frequency raisers, in which use is made of the fact that the magnetizing current of a transformer working on a sine wave E.M.F. is generally very far from being a sine curve.

The exact shape of this current curve depends on the state of magnetic saturation of the magnet core, and may be varied, within limits to suit the requirements. The Fourier analysis of the above current curve shows that there is a prominent third harmonic present in the current wave. This will generally be found to be the case.

It is possible by suitably designed tuned oscillation circuits to strengthen this third harmonic by resonance, and therefore to obtain from a given alternating current E.M.F. of approximately sinusodial wave form a current of three times the frequency of the original supply. This current may be utilized in a similar manner to produce another of three times its own frequency—*i. e.*, nine times the initial frequency, and so on.

Comparing this method with the frequency adders previously described, it is seen at once that a very much more rapid multiplication of the frequency is obtained; thus, three stages would raise the frequency 27 times. The great limitation to this method is that it is not very easily adaptable to handling large powers, since the magnetizing current of a transformer is quite small.

Receiving Apparatus—This generally differs but little from the apparatus used in wireless telegraphy. The detector, however, should be such that its indications are proportional to the energy received, as otherwise distortion of speech results. Amplifiers may be referred to as of the microphonic and vacuum types. S. G. Brown's relay is typical of the former type, and to the second class belong the "Audion" and "Pliotron."

The Telephone at the National Conventions

Republicans and Progressives at Chicago Find Bell Service Indispensable, Says the Bell Telephone News

TO care satisfactorily for two national conventions held simultaneously within her gates is all in the day's work for Chicago. The delegates and visitors who attended the conventions of the Republican and the Progressive parties found ample and pleasant accommodations, commodious auditoriums in which to conduct their business, and warm and generous hospitality extended by the city authorities and the residents. True, there was some rain. It began to fall at one o'clock Tuesday morning and continued to fall until eleven o'clock Saturday morning. But that might have happened any place. Some people said they never saw so much rain. Well, that, too, is characteristic of Chicago —whatever she does, she does just a little stronger than other places do.

The notable feature of the Republican National convention from a telephone standpoint was the presence of Theodore N. Vail, president of the American Telephone and Telegraph Company, who was chairman of the Vermont delegation. And just to keep his record clear for foresightedness, preparedness and the like, it is of interest to record that in casting Vermont's vote on the third and final ballot Mr. Vail announced, "Vermont, on the third ballot as on the first, casts her eight votes for Charles E. Hughes."

The telephone equipment at the Coliseum for caring for the needs of the public was more elaborate than ever before. Stations, in charge of experienced operators, were distributed liberally throughout the vast building, and at no time was there any noticeable congestion of traffic. The force and equipment of the Chicago Telephone Company were under the direction of W. G. E. Peirce, representing the commercial department, L. A. Zielinski, the traffic department, and J. H. Riddel, the plant department.

W. E. Bell, commercial superintendent of the American Telephone and Telegraph Company, a veteran of many national conventions, handled the long lines service and the bulletin service for his company.

The arrangements for caring for telephone traffic at the Progressive National Convention, held in the Auditorium Theater, were as complete as were those at the Coliseum. The Chicago telephone service was in charge of O. Sorlin, pay station manager, while the long lines and bulletin services of the American Telephone and Telegraph Company were under the direction of Charles Barnett.

The American Telephone and Telegraph bulletins were edited by C. H. Fuller and E. J. Wehrley of the general commercial superintendent's office in New York. At the close of the convention these officials went to St. Louis and performed a like task at the Democratic National Convention.

Chicago began to be a national convention city back in 1860, when Abraham Lincoln received the Republican nomination for president in a convention held in the "Wigwam." Since that memorable meeting of a stripling party Chicago has entertained many other national political gatherings of scarcely less historic importance. The Democratic convention which nominated William J. Bryan in 1896 after his famous "cross of gold" speech was held in the old Coliseum at Cottage Grove avenue and Sixty-third street. Here also was adopted the celebrated "Chicago Platform," which doomed the Democratic party to defeat for almost a generation. The building in which this meeting was held later collapsed, and the project was conceived of erecting a larger and more permanent structure, which would give the city facilities to handle any convention, no matter how big.

The site chosen was that occupied by Libby Prison, on Wabash avenue at Sixteenth street. This famous old building had been brought in pieces from Richmond, Virginia, and reconstructed as a war museum at the time of the World's Fair. To make room for the Coliseum it was again razed and the parts returned to Richmond, each separate brick in a cigar box. There it was restored to its original location, and remains one of the "sights" of the former capital of the Confederacy.

The Coliseum was finished in time for the Republican National Convention of 1904, which nominated Theodore Roosevelt. It was the scene of the nomination of William H. Taft in 1908 and his renomination in 1912 under circumstances which produced the great schism in the party and caused his defeat for re-election. And in June. 1916, it saw the nomination of Charles E. Hughes as the Republican standard bearer in the convention whereof we now speak.

The Coliseum is a stone and steel building 378 by 150 feet. The dome is 105 feet high. The building seats 14,000 and was filled to capacity at every session of the convention.

As usual the telephone played a very important part in handling the great amount of business that was necessary both before and during the convention. The executive offices of the National Committee were located on the second floor of the Coliseum Annex, and here the sergeant-at-arms, Colonel William F. Stone, established headquarters about one month prior to the date set for the opening. Private branch exchange service was furnished, but instead of installing a switchboard in the Coliseum, Commercial Superintendent W. G. Luscombe arranged for the use of a section of switchboard at the Chicago Telephone Company's Calumet office. This arrangement worked smoothly. The private exchange as thus arranged consisted of two trunks and thirty-two terminals, connecting Colonel Stone's office; offices of Charles D. Hilles, chairman of the National Committee; James B. Reynolds, secretary of the National Committee; the Associated Press, the doorkeepers, the band stand, the convention post office, the emergency hospital and various parts of the large convention hall.

The general telephone service for the public was handled through thirty-three pay stations. In the northwest corner of the Annex, main floor, was an attended pay station of thirteen booths, eight of which were equipped with 3-S coin box telephones. The remainder were operated through a switchboard served by an attendant and two pages. In connection with this pay station, but separated from it on account of the large doors opening into the convention hall, was a group of three booths equipped with coin box telephones and with page in attendance.

In the southwest corner of the convention hall was a permanent pay station of ten booths with attendants,

and, in addition, booths with coin box telephones were located in the southeast, northeast and northwest corners of the convention hall, main floor, and in the southeast, northeast and northwest corners of the gallery.

It will be seen at once that an installation so comprehensive as above described could not fail to supply service in almost any conceivable amount and of any character desired. And so the results proved. The sergeant-at-arms and officers of the convention were unsparing in their praise of the splendid service given by the Calumet forces on the private exchange, and the public found the local and toll facilities afforded by the thirty-three pay stations entirely adequate and satisfactory.

In a letter to W. G. E. Peirce, chief commercial agent of the Chicago Telephone Company, Colonel William F. Stone, sergeant-at-arms of the convention, pays a high tribute to the service and the officials and employés who supervised and furnished it. Colonel Stone said:

"If I knew the officials of your company, I would say to them that I congratulate them and the company upon having such an effective, efficient and unselfish official to care for their interests as they have in you, and I say to you that you have every reason to be glad that you have associated with you such subordinates as will carry out your every order, as your subordinates have done for the convention, of which I was in physical charge. Will you say to each of these subordinates of yours that I thank them for their co-operative work under your supervision and direction in helping to make possible the efficient and complete and perfect telephone service which we have for the convention purposes."

The installation of facilities was under general supervision of Equipment Superintendent A. P. Hyatt and Division Foreman J. H. Riddel. J. A. Simpson acted as wire chief and was in personal charge of maintenance of equipment. E. F. Bredlow was foreman in charge of installation. In addition to providing the facilities described above, the Equipment Division installed twenty-five Americain Telephone and Telegraph Company telegraph loops for the several press associates and connected with various parts of the country; seventy-six Morse loops for the Western Union Telegraph Company; five direct exchange and three private lines to newspapers, six Western Union call boxes and three Western Union clocks.

The Progressive National Convention was held, simultaneously with the convention of the older party, in the Auditorium Theater, the home of grand opera in Chicago. The walls, which during a quarter of a century have echoed the beautiful voices of such artists as the De Reszkes, Calve, Campanari, Schumann-Heink, Homer, Farrar, McCormick and Caruso, now vibrated with the applause evoked by the name of Roosevelt.

The Auditorium building illustrates how the versatile western American can combine sentiment with thrift. The wish of Chicago to possess an opera house larger and finer than the Metropolitan in New York gave birth to the Auditorium proper; the desire to make it self-sustaining produced the Auditorium building, which includes within its four walls the great Auditorium, with its mammoth stage and organ, the Auditorium Hotel, one of the leading hotels of the city and from an architectural standpoint one of the finest hotel structures in the world, and an office building giving quarters to a large number of tenants. The building is practically a shell, with the big theater in the center. The permanent seating capacity of the Auditorium is four thousand. When the stage, which measures seventy by one hundred and ten feet, is used, as in the case of the convention, the seating capacity is almost doubled. The stage and organ are probably the most costly in the world. The theater was dedicated December 9, 1889, and the entire building was completed in 1890. The hotel was opened in time for the World's Fair in 1893 and the fame of its luxurious elegance was carried far and wide by the thousands of Fair visitors. The Auditorium Hotel has 363 telephones and twenty trunks operated through a four-position switchboard.

The Auditorium Theater, second only to the Coliseum in seating capacity, is always in demand for meetings or performances for which a large stage is essential. For about ten weeks each year, in midwinter, the Chicago Opera Association reserves the theater for its program of magnificent grand opera, when the leading musical artists of two continents gather for a series of performances before the most appreciative audiences to be found anywhere. During the remainder of the year it is available for performances of all kinds where large stage and seating capacity is required. It was the scene of the celebrated "Triple Alliance Minstrels," two years ago, when the Chicago Telephone Company, the Peoples Gas, Light and Coke Company and Commonwealth Edison Company joined forces in producing a monster performance, which netted the United Charities almost $25,000. Last winter the Chicago Telephone Band and Orchestra and Chicago Telephone Players Club joined in a performance which brought two big audiences of Chicago telephone employes and their families to the Auditorium. The People's Church holds services in the Auditorium every Sunday morning and hundreds of over-Sunday hotel visitors and downtown dwellers have the opportunity to hear the wonderful organ and a stirring sermon by the Reverend Frank W. Gunsaulus, one of Chicago's ablest pulpit orators.

While no important national political convention had been held in the Auditorium up to this year, it may be regarded as the birthplace of the Progressive party. During the excitement preceding the renomination of President Taft by the Republicans in 1912 a monster meeting was held in the Auditorium. Here Colonel Roosevelt delivered his famous "Armageddon" address which was the Progressive declaration of principles.

The importance of the Progressive Convention was foreseen by the Chicago Telephone Company. It was evident that, whatever the political results might be, the convention would be a lively affair and the telephone would naturally be in lively demand. Arrangements were therefore made to supply adequate facilities for every normal use and for emergencies. The major equipment for general public use consisted of nineteen attended pay stations in booths connected to a No. 30 private branch exchange switchboard equipped with ten trunks and one long-distance loop. In addition to this equipment, Mr. Hyatt's division installed six American Telephone and Telegraph Company telegraph loops for press associations, twenty-one Morse loops for the Western Union Telegraph Company, one private newspaper line, five coin-operated public pay stations in booths, three Western Union clocks and three Western Union call boxes. This installation was made by a force under direction of T. H. Emerson. The principal part of the traffic originated at a four-booth pay station on the first floor foyer. Another busy station was on the second floor foyer, where two coin-box booths were located.

Three booths on the stage, equipped with coin-box instruments, also did a big business.

While the conventions are held in the great halls and the votes are here taken and recorded, it might truthfully be said that the actual nominations are made in private rooms of the large hotels, where the delegations caucus and the political leaders and the candidates have their headquarters. The Congress Hotel at Michigan avenue and Congress street has probably been the scene of more political "jockeying" than any other hotel in America. Here all the principal Republican candidates for president maintained headquarters during and a few days prior to the convention. For a week in June of this year "Peacock Alley" was the political center of the United States.

It was inevitable that such a political beehive should hum with telephone traffic. However, no special preparations were necessary to handle this traffic. The Chicago Telephone Company has a large attended pay station with a number of booths in a prominent location in the big lobby. The hotel is also thoroughly provided with telephone facilities. A six-position switchboard with sixty trunks to the Harrison office gives service to 1,005 stations, connecting all departments and every guest room.

The Blackstone, one of Chicago's newest and most elegant hotels, entertained a large number of prominent delegates to both conventions, as well as a number of people of social prominence from all over the country, who took occasion to visit Chicago during the political gatherings. Blackstone telephones were busy throughout the week. The hotel has a four-position switchboard with thirty-eight trunks to the Harrison office. Terminals and extensions number 496, giving service to all departments and every guest room. George W. Perkins, manager for Colonel Roosevelt, kept in constant touch with the Colonel over a special long-distance circuit, connecting his suite at the Blackstone with Sagamore Hill, Oyster Bay, N. Y. This circuit was provided by the American Telephone and Telegraph Company.

The Progressive National Committee had headquarters at the Hotel La Salle, which throughout convention week was the scene of night and day activity. The La Salle, which at all times is one of the busiest hotels in the world, is splendidly equipped in a telephone way. Its eight-position private branch exchange is the largest hotel installation in the city. Thirty-two trunks connect the hotel board with the Franklin office of the Chicago Telephone Company, while the terminals and extensions number 1,095. Every guest room has its telephone and every department from sub-basement to roof garden is in touch with headquarters. A battery of booths in the main lobby supplies pay-station service.

Delegates and visitors who made headquarters at the Hotel Sherman found much to interest them. The indoor skating offered by the Sherman as a nightly feature at the College Inn attracts thousands to this celebrated restaurant. Several delegations were entertained at the Sherman and found the accommodations, including the telephone service, entirely satisfactory. The Sherman receives service through a six-position switchboard with twenty-eight trunks, connecting with the Franklin office of the Chicago Telephone Company. The interior system consists of 802 stations, connecting all guest rooms.

It would not be possible within the limits of this article to mention all the hotels and places of entertainment which joined in extending hospitality to the convention visitors. In addition to those entertained at the hotels named above, many delegates and convention visitors found Chicago welcome at the famous old Palmer House, the Morrison, Fort Dearborn, Great Northern, Stratford, Grand Pacific, Planters, Lexington, Metropole and Kaiserhof hotels. Many visitors, knowing the fame of Chicago as a summer resort, took quarters in the numerous delightful hotels lying along and near the shores of Lake Michigan, away from the business centers. The Edgewater Beach Hotel, seven miles north of the loop, was completed in time to entertain its quota. The Chicago Beach, Del Prado, Hyde Park and Windermere on the south side, and the Virginia, Ontario, Plaza and Sheridan Park on the north side each took care of a portion of the convention crowd.

The telephone played no small part in the necessary work connected with the entertainment of the visitors. As far back as January, after it became known that the Republican gathering would be held in Chicago, Mayor William Hale Thompson appointed a special committee, whose particular assignment was to provide entertainment and extend the hospitality of the city in an organized and intelligent way. John P. Garner was chosen chairman of the committee; Dr. John Dill Robertson, secretary; Nelson N. Lampert, treasurer; and G. W. Bassett, assistant secretary. A program of receptions, automobile rides, visits to large commercial and industrial institutions, balls, theater parties, fireworks display, fire department exhibition, and amusements generally was arranged. Unfortunately, the rain prevented all except a very few of the affairs scheduled for out of doors. The activities of the committee began the week preceding the convention, when the delegates and alternates began to arrive. The committee had secured the use of more than 600 automobiles and these were mobilized by telephone as needed to meet arriving trains. Assistant Secretary G. W. Bassett, from his office in the City Hall, with the assistance of six telephone operators, gathered the machines as needed. Every delegate and alternate was met and furnished with a credential, which gave him the privileges of the city—and this is no mere hurrah stuff; the privileges were substantial. Many of the leading clubs opened their doors to the visitors; they were invited to play golf on the best courses, and a block of 5,000 seats at the Automobile Speedway was reserved for them and their families. A ball, given in twelve hotels, was the principal social event. Mayor Thompson and a party of the candidates' campaign managers made a trip by automobile, visiting every one of the twelve ballrooms during the course of the evening.

The story of this week would not be complete without mentioning the convention of the Congressional Union for Woman Suffrage, held in the Blackstone Theater. This intrepid band is attempting to secure an amendment to the federal constitution, which will remove all political disabilities from women. Several thousand of the delegates and Chicago suffrage enthusiasts marched down Michigan avenue in a pelting rain and presented a monster petition to the Republican convention, asking that a suffrage plank be included in the platform. A plank, affirming adherence in principle to the doctrine of suffrage, was adopted.

A few days before the preparedness parade a squad of telephone girls from one of the downtown offices was drilling in Grant Park. Suffragists, who were holding an open-air meeting, invited the girls to join the suffrage movement. All accepted and a battalion was recruited for the suffrage army then and there.

When a corporation tells you that it will not sell any stock to capitalists or rich investors, you can be sure the capitalists are not losing any sleep over the loss.

Common Sense and Public Utilities

Address Before the Youngstown, Ohio, Chamber of Commerce

BY NATHANIEL T. GUERNSEY*

THE general and almost universal interest in matters relating to public utilities is entirely legitimate. It is the normal, natural result of their very intimate and direct relation to the comfort, convenience and well-being of the public at large and of every individual member of the community.

This interest has manifested itself, especially within the last few years, in the enactment of laws which have created commissions having more or less extended jurisdiction over these utilities. These laws may be taken as the concrete expression of the verdict of the public that some regulation is requisite and that local regulation has been a failure. Another conclusion on the part of the public that finds very general expression in these laws is that it is not for the public interest to have two public utilities attempting to furnish the same service to the public in the same local field. This involves not only duplication of facilities, but also a more or less general duplication of charges. Moreover, it is common experience that the normal results of such a condition are, first, controversy, second, insolvency, or near insolvency, with corresponding impairment of service and public inconvenience, and finally, consolidation.

A law providing for regulation by the state was enacted in Ohio in 1911. It contains ninety paragraphs which fill twenty-seven closely printed pages. Its scope is very broad. The jurisdiction of the Ohio commission includes railroads, telegraph companies, telephones, electric light for light, heat and power, artificial gas for the same purposes, natural gas for the same purposes, the transportation of natural gas and oil, water companies, heating and cooling companies, messenger companies, signaling companies, and street and interurban railway companies.

While the commission law is necessarily elaborate in its provisions creating the commission, defining its jurisdiction, and providing the procedure for the exercise of its powers and for the enforcement of its orders, the fundamental things in which the great body of the public is directly interested are simple.

There has been too much talking upon this question and too little thinking about it, or perhaps to be more accurate, the people who have done the talking have been theorists without the knowledge from practical experience that is essential to sound thinking, while the people who have had this experience and have done the thinking, have talked too little. I should like, disregarding the technicalities which surround the matter, to discuss some of the simple fundamental things which your sound common sense will recognize as matters that should be clearly understood if the satisfactory relations between the utilities and the public which we all desire are to be maintained on a sound basis.

THE FUNDAMENTAL RIGHTS OF THE PUBLIC.

The first step toward understanding the situation is a clear comprehension of just what are the rights of the public. They are defined with commendable brevity in the Ohio statute. I believe that everything which it includes is embraced in the statement that what the public is entitled to is good service that shall be adequate and comprehensive, without unjust discrimination, at reasonable rates for such service. Good service defines itself.

By adequate and comprehensive service, it is intended to describe a service that is as extensive as is commercially practicable so that the service may be available wherever the cost is not so great as to be prohibitive. Gas mains and water mains, and in a less degree electric light lines, cannot be extended so as to serve every member of a sparsely settled community. Such a service would cost more than it would be worth. The facilities for every public service should keep up with, and a little in advance of, the public demand for the service. So far as it is not prohibited by cost, the service should be available to everyone.

Freedom from unjust discrimination has always been a legal right and is something which a people accustomed to liberty and fair dealing demands as a matter of course.

Finally, the public is entitled to and demands reasonable rates. Also, it is my personal opinion that the very large majority of the public is willing to pay them. I believe that the majority of the public is willing to be and intends to be fair and honest.

MACHINERY TO ENFORCE THESE RIGHTS.

The commissions are nothing more nor less than the machinery provided by these laws to see that these rights are not infringed and to protect some of the rights of the utilities as well.

The commission laws have not created new rights either in the public or in the utilities. The four fundamental public rights which have been discussed, namely, good service, adequate and comprehensive service, service without unjust discrimination and at reasonable rates, and the rights of the utilities to charge compensatory rates and to manage their property without interference so long as the rights of the public are respected, are none of them created by these laws, but are all of them old rights.

The primary function of the commissions is to keep themselves advised as to the situation. It is not their function to interfere until there has been an infringement of the rights of someone. Provision is made for reports by the utilities, showing in great detail the results of their operation. Provision is made for filing rates with the commissions so that they and the public may know just exactly what rates are charged, having in mind not only reasonableness, but unjust discrimination as well. Provision is made for notifying them of any change in the situation. Provision is made for supervision of the accounts. All of this is for the purpose of keeping the commissions advised so that they may be in a position to determine whether any of these fundamental rights are being violated. If they are, it is the duty of a commission to act. If they are not, no affirmative action upon the part of a commission is either necessary or justifiable.

This indicates very clearly what the attitude of the commissions should be. They should bear in mind these important fundamental things to which practically every power of the commissions is referable; they should be jealous in their insistence that these rights be recognized; but where they are recognized, where the utilities are respecting the rights of the public, the commissions

*General Counsel, American Telephone and Telegraph Company.

should give like respect to the rights of the utilities. There should be no regulation merely for the purpose of regulating. The utility which recognizes the rights of the public should be made secure in its own rights.

SOME OF THE THINGS WHICH THE COMMISSION MAY NOT DO.

While the power to regulate is perfectly well established and is not questioned, it is also established that the power to regulate is not broad enough to include the power to manage. Management is something that goes with ownership. The right to manage is inseparably connected with responsibility for the results of management. Commissions may not undertake to manage. If they could, it would be imperative that they be held responsible not only to the public, but to the investors, for the results of their management, whether they were good or bad. Moreover, commissions which aspire to manage must assume the burden of management which requires the determination of important questions in advance. They may not wait until after the event and base their conclusions upon the facts as they exist then. Management must determine questions before the event, and must stand or fall upon the correctness of such determinations. Commissions, if they are to assume to exercise the powers of management, must exercise them in the same way and must assume the same responsibilities.

In general, there should not be great uncertainty whether any specific matter presents a question of management or a question of regulation. Cases will, however, arise where there may be honest differences of opinion as to whether they fall on one side of the line or the other. They may be readily disposed of, if the parties will have in mind that the real justification of commissions and the expense they entail is the protection of the public rights which have been mentioned. A practice that will accord to them all the power they need and will not attempt to usurp powers they do not need, will work out a practical result that no one may very seriously condemn.

WHAT REGULATION CANNOT DO.

Granting the broadest powers of regulation, and granting further that regulation may usurp the functions of management, there are some things which cannot be accomplished by regulation or by management, or by legislative acts. There are certain fundamental economic laws that are permanent and persistent and effective, which cannot be overthrown. Whenever regulation, either through the action of a commission or by direct legislative enactment, attempts to go contrary to these laws, regulation will suffer, the public will suffer, and the utilities will suffer, and the public will ultimately pay the bills, but these laws will remain unimpaired and effective.

One of the things which is determined by these fundamental economic laws is, what is a fair return. One of the most common misapprehensions with reference to regulation by commissions is that commissions have the power to say what is a fair return, that is, what money invested in public utilities may earn. A very little consideration is sufficient to demonstrate to anyone that this is a radical misconception. No public utility is ever a completed investment. That is nowhere illustrated better than in a growing city such as Youngstown. Since 1900, the population of Youngstown has multiplied itself by three. Your street railroad service, your interurban railway service, your telephone service, your water service, your gas service, your light service, and every other service which you have, has been compelled to meet this increase in population by a corresponding increase in investment, and as your city continues to grow, this investment will have to keep pace with it, if you are to have the service to which you are entitled and which I am sure every one of the utilities wishes to furnish you.

As recently as 1910, the Central Union Telephone Company marked the completion of its exchange here by issuing a souvenir congratulating Youngstown upon the fact that the exchange then just finished was as modern and up-to-date and efficient as any telephone exchange in the world. I know nothing about the equipment of that exchange, but I know that at that time it had about 3,400 telephones, and I know that in the last two and one-half months of 1915 there were added to the exchange in Youngstown about 1,700 telephones, one-half as many as the total number in 1910, and that the present number of subscribers is over three times what the number was in 1910. Without knowing anything about what was the exchange in 1910, I know that its capacity would be absolutely inadequate for what is demanded of the exchange today, and that the investment must have been increased several times in order to keep pace with the development and growth of this city.

The constant, persistent, important question that confronts the management of a public utility is, how to secure this new money; these additions to the plant mean additions to the investment, and this means new money. This money must be obtained in a competitive market. There is a certain amount of money that is seeking investment. There are certain investments that are seeking this money. The men who own the money will put it where, hazards and the other material conditions being taken into account, it will afford them the highest return. It is sheer and utter nonsense to talk about a return for money invested in public utilities relatively smaller than what may be derived from other like investments. This will be true so long as what we call the law of supply and demand is effective. If I were to offer to you some public utility securities and at the same time should offer you some other securities which were exactly as good but which would bring you a higher return, you would not buy the public utility securities. This is the condition which actually exists and confronts the utilities every day when they are trying to obtain money. They cannot go to the investor and induce him to buy their securities unless they can offer him as much in the way of profit and safety as he may obtain elsewhere. The investor is the only man who can say what he will take for his money. Other people may think they know better than he does what he ought to take for it, but when it comes down to the final analysis, he is the man who will determine the question.

These are the reasons why commissions have not the power to say what money invested in public utilities may earn. The only way in which the commissions can influence the return is indirectly, through the character of their regulation. Sound, business-like regulation will tend to stability and to make the investment more attractive, and therefore will tend to lower the return which must be paid in order to induce money to go into it. Regulation that is not of this character will have the opposite tendency and its effect will be to increase the cost of the service to the public.

WHAT IS A REASONABLE RATE?

There are two cardinal factors which are the most important factors in determining what is a reasonable

rate, or a schedule of reasonable rates. They are, first, the cost of the service, including the cost of obtaining the necessary money, and second, the value of the service to the man who buys it. The application of a little common sense will demonstrate the soundness of this statement.

It goes without saying that no utility can, speaking broadly, furnish service for less than it costs. It cannot do this of its own motion, nor can it be compelled to do it by the order of any commission or other public authority. Rates may be prescribed which will not equal this cost of the service, but the result will not be cheap service. It may be cheap service for a little while, but there will follow insolvency, then dear service, and in the meantime, poor service. No one has ever yet made a permanent success of an effort to obtain something for nothing. The minimum factor then, in determining what is a reasonable rate, is the cost of rendering the service, which of necessity includes the cost of obtaining the money.

The other factor is the value of the service to the consumer. Speaking generally, it is just as impossible to sell something for more than it is worth as it is to sell it for less than its cost. The reason is the reason suggested by common everyday experience, that people will not pay for things more than they are worth. The price must be low enough to make what the customer receives worth more to him than what he pays, if he is to be induced to buy freely. This value of the service to the consumer marks the maximum beyond which reasonable rates may not go.

To digress for a moment, it very likely has occurred to you that there may be difficulty in determining this value. There is, just as there is more or less difficulty in determining the value of anything that is for sale. The ultimate test is experience. It is safe to say that where there is a schedule of rates which produces a good development, so that the aggregate volume of the service is sufficient to meet the requirements and convenience of the community, and which produces a harmonious development, that is, a relatively normal development in the various classes of the service, the prices charged are less than the value of the service to the consumer. And if with such a development these rates produce a revenue which affords the utility a reasonable profit, the rates are reasonable.

Returning from this digression, between these two limits, that is, the cost of furnishing the service, including the cost of obtaining the necessary capital and the value of the service to the consumer, lies the legitimate field for regulation. With these two factors established, there are a number of considerations which the ordinary business man, and this is a business question, I think will recognize immediately as material to the determination of the question. There are equitable considerations, such as whether the business has been profitable or the reverse. There should be taken into account the character of the community, what the prospects are as to its development and therefore as to the requirements for additional money, what the character of the management has been, whether it has been good or bad, and is entitled to a premium or a penalty, what the character of the service has been, and any special considerations peculiar to the particular case that is under consideration.

A clear comprehension of the two cardinal factors of cost and value to which I have referred, and of their effect upon the situation, with a reasonable consideration of the other factors, ought to make it a comparatively easy thing to arrive at a schedule of rates that will be fair to both the public and the utility, that is, that will afford a profit to each of them, furnishing the service to the consumer for less than it is worth, and paying the utility more than its bare cost.

CO-OPERATION.

The relation between the utilities and the public is not unlike that which exists between an employer and an employee. The public is the master—the utilities are the servants. Unless the master has at heart the interests of the servants, and unless the servants have at heart the interests of the master, it is impossible to obtain the best results for either of them. This has been demonstrated by common experience over and over again. The difference between the interests of the utility and the interests of the public, in so far as it exists, is very closely analogous to the difference between the interests of the master and of the servants whom he employs. While there is a diversity of interest of this character, the situation is such that to further the interests of either, it is necessary to take into account the interests of the other, so that both shall co-operate and work together harmoniously and loyally. This is just as true of the public and the utilities as it is of the ordinary master and servant.

No permanent advantage can accrue from unwarranted attacks on public utilities, any more than a permanent advantage can accrue from unwarranted attacks upon employees. There is no advantage that can arise from mutul distrust. There is no advantage in mutual ill will. These things are positive disadvantages from every point of view. To obtain the best results, there must be good will, there must be co-operation, and there must be the mutual trust and confidence that can only be created by being deserved. Each must recognize and respect the interests and rights of the other.

SUMMARY.

The fundamentals underlying regulation are, as has been stated, simple. What the public wants is good service, comprehensive service, free from unjust discrimination, at reasonable rates. The function of regulation is to prevent the infringement of these fundamental rights. Under the guise of regulation, the public may not undertake the management of public utilities, nor can it through regulation obtain the service for less than it is worth. Reasonable rates are rates exceeding the cost of the service and less than the value of the service, which, within these limits, take into account business and equitable considerations. Co-operation is necessary to obtain the best results just as it is necessary between employer and employee. Finally, the public pays the bills. The cost of regulation is, in the ultimate analysis, a charge against the service which the public must pay.

If these few things are thoroughly understood, if there be kept clearly in mind what the public wants, what are the true functions of regulation and the limits upon what regulation may do, and that good results must come from co-operation and not from controversy, if politics be eliminated and business predominate, regulation will be worth more than it costs and will be a substantial benefit to both the utilities and the public. It cannot benefit one unless it benefits both.

Tri-State Telephones for Fort

Special telephone facilities have been provided for the Ft. Snelling, Minnesota, mobilization camp.

Tri-State Telephone Company men have run cables to brigade headquarters and to the artillery and infantry encampment sites.

What Advertisers Can Get From Trade Papers

Suggestions for New Ways of Developing Neglected Opportunities

BY CHARLES L. BENJAMIN

TWENTY-EIGHT years ago I left my home town to seek work in New York and found it in the office of a trade-paper publisher. From that day to this my life has been spent among publishers and advertisers. I have been an editor, and for a good many years I have been an advertising manager, and so if I venture to suggest some of the ways in which I think trade-paper publishers can help their advertisers, what I say is not in the nature of criticism from one outside the fold, but rather in the way of suggestions from one of your own family, who is not unmindful of the tremendous progress that has been made in the field of class journalism within the past quarter of a century.

How could I fail to be impressed with the progress that has been made when I think of those first trade papers with which I was connected? There were four of them, not one of which, I believe, survives today, except as a memory. But they were in their day leaders in their respective fields, and they were typical of the average trade paper of 25 years ago.

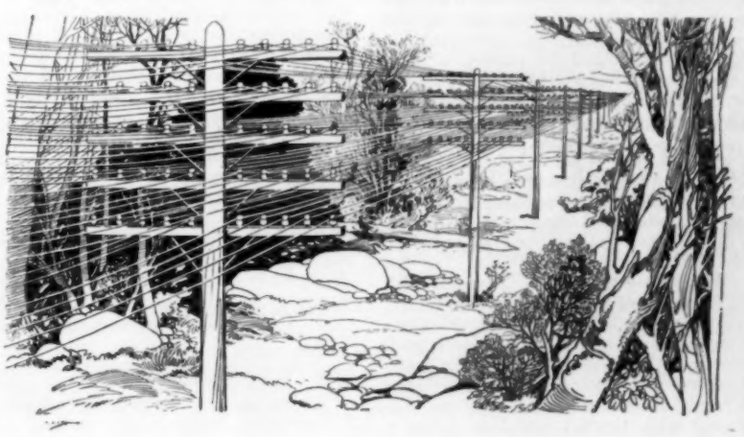
The editorial force was small and poorly paid. The stuff we printed consisted largely of trade notes, personal items and write-ups for our advertisers. Our printed rate-cards represented nothing but a basis for arbitration, and our circulation was nobody's business but own own. Our advertising manager was one of the old school, who, if he failed to convince a prospect that advertising in our publications would help him, would take the other tack and remind him that we were in a position to hurt him if he didn't advertise.

It is needless to say that the advertisements were as bad as the methods used to obtain them. The advertisers rightly considered them a sop to the publication, and the same quarter pages and eighth pages would run unchanged week after week and month after month, because the advertisers felt that the space did them no good, anyway, except to prevent adverse comment, and the publishers were not inclined to encourage change of copy, because that meant additional expense in the composing-room.

How greatly things have changed in the class-journal field I need not tell you. The trade and technical publications of today are not leeches, but leaders. They are doing constructive work; work which is of benefit to the industries they represent, and which could only be done by such splendid and costly organizations as are maintained by the leading trade and technical publications. *Advertising rates are based on cost of production, circulation books are open to the advertiser and there is a real community of interest between the trade-paper publisher and the merchant or manufacturer who uses the advretising pages of the publication.*

THE ADVERTISER DESERVES THE HELP OF THE PUBLISHER.

The advertiser is entitled to all the help you can give him, because it is from him that you derive the funds that enable you to conduct your business. The time has long since passed when more subscribers meant more profits. *Every subscription today means a loss,* for the trade paper that costs the subscriber three dollars for 52 issues costs the publisher three or four times that sum to produce. The subscriber is only valuable to you because he is a potential customer of your advertisers. This fact is of itself beneficial to your advertisers because it leads you to seek *not circulation merely, but circulation with purchasing power.* As publishers you have just two things to sell: news—trade information—which you sell at a loss to your subscribers, and access to the possible customers which you sell at a profit to your advertisers.



The importance of the advertiser to the trade-paper publisher being taken for granted, the question is: In what ways can you assist this good customer? Perhaps the experience of the advertiser himself may contain a suggestion for you. The trade-paper advertiser is usually a manufacturer, and in former years manufacturers considered that the advertising and sales departments had done their whole duty when the output of the factory had been disposed of to dealers. It was the dealer's business to secure customers for the goods he had purchased from the factory. But it was discovered in time that the dealer could dispose of the goods more quickly, and would thus be sooner in the market again, if he had the assistance of the factory in disposing of them; and so it came about that the manufacturer began to study the dealer's problems, and, having in his sales force a well-organized body of trade investigators, he was able to formulate effective selling plans for the dealer that the latter would never have been able to devise for himself.

Moreover, the manufacturer, having advertised his goods to the dealer, went a step further and advertised them to the consumer as well, thus creating a consumer-demand that cleared the dealer's shelves and made him anxious to continue business relations with a concern whose interest in his welfare continued after the goods were delivered and the bill paid.

Now, the relation of the trade-paper publisher to his advertiser is somewhat similar to the relation of the manufacturer to the dealer. The dealer buys the manufacturer's product because he hopes to makes a profit on it, and the manufacturer buys your advertising space because he, too, hopes to make a profit on it.

If you consider that you have done your whole duty when you place at the disposal of an advertiser a certain amount of space for a stipulated price, then you are pursuing a policy similar to that which stocked the dealer's shelves and left him to dispose of the goods purchased as best he could. But if you will profit by the experience of the manufacturer, you will use your knowledge of the trade or industry your publication represents, your facilities for conducting trade investigations and the influence which your journal has with its readers, to the end that no advertiser should be loaded up with advertising space and then left to make the best use of it he can. Just as co-operation with the dealer after the goods are sold to him is profitable to the manufacturer so will co-operation with the advertiser after the advertising contract is signed be profitable to the trade-paper publisher.

A DEPARTMENT THAT POINTS TO ADVERTISING.

I am not an advocate of the free write-up, or trade note, unless it possesses real news value, but I believe it would be both possible and profitable to create somewhere between the reading pages and the advertising section a department which would focus the attention of the reader on the goods advertised in your publication. This does not mean that in every issue you must make some mention of each advertiser's product, but that the various classes of goods advertised in your publication should be grouped together in articles designed to place before the dealer in convenient form for ready reference all of the information contained in the various advertisements of one class, together with such additional information as may be gleaned from your advertiser's catalogues or from interviews with dealers or consumers.

Articles of this nature would be of value to the reader as well as the advertiser, and might be used as an introduction to the advertising pages or inserted in the advertising section.

Another service that trade-paper publishers can render their advertiser is to find new uses for the products advertised in their publications. It is a mistake to assume that a manufacturer knows all the possible uses of the product he manufactures. As a rule he manufactures

to meet the requirements of a particular class of trade with which he is familiar, but there may be ways in which his product could be utilized in other trades with which he is not familiar. In time, it is true, he may and probably will discover these other applications himself, or, what is more likely, someone familiar with the requirements of some trade with which our manufacturer is not acquainted will see the product somewhere, realize that it can be used to advantage in his line of work, and write to the manufacturer regarding it. But this is leaving to time and chance a thing that trade-paper publishers might, by co-operative action, bring to pass quickly.

PUBLISHER MAY FIND NEW FIELDS FOR ADVERTISER.

Let me ilustrate what I mean by an example that comes within my own experience. A company manufacturing electrical apparatus did considerable business with coal mines. Because of its familiarity with this industry it was able to develop apparatus suited to the requirements of coal mines, and, among other things, developed a magnetic pulley. This consisted of an electro-magnet, cylindrical in form and provided with a shaft that enabled it to be mounted in bearings, on which it revolved. A conveyor belt passed around this magnetic pulley and on this belt the lumps of coal were carried to the crushing machines in which "run of mine" coal is broken up into the commercial sizes, known as "egg," "stove," "pea" coal, etc.

The purpose of the magnetic pulley is to protect the crushing machine from damage due to stray bits of iron or steel passing into the crushers with the coal. These bits of "tramp" metal, as they are called, may be a nail or a nut, or more often a broken pick-point or drill point. A small piece of iron or steel mixed with the coal is quite likely to cause considerable damage to the crushing rolls and may even cause a shutdown until repairs can be made. The magnetism of the pulleys, having no attraction for coal, which is non-magnetic, permits the lumps to fall off the belt into the hopper of the crushing machine; but any bit of iron or steel, no matter how small, which may be mixed with the coal is attracted by the pulley and is held in contact with the belt until it passes around the pulley, when the "tramp" metal falls off from the under side of the belt but clear of the hopper. Thus all bits of metal which might injure the crushing rolls are automatically separated from the coal and this separation is effected by a piece of apparatus occupying only a few feet of space and costing only a hundred dollars, or so, to install.

Now, the point is this: The magnetic pulley was developed some ten years ago for use in the coal-mining industry. It was sold in the beginning only to coal mines. But ten years ago there were a dozen other industries in which magnetic pulley could have been used to advantage. Little by little, and always by chance, knowledge of these other applications have come to the manufacturers of the pulley, but there are doubtless scores of other uses for it that have not yet been discovered.

One of the first industries to adopt it after the coal mines had been using it for several years were the cement mills. Cement in the process of manufacture is also passed through crushing rolls, or pulverizing machines, and these machines, like the coal-crushers, were frequently damaged by bits of metal getting into them. The magnetic pulley was just what the cement mills wanted; but the manufacturer who developed the pulley for coal mines wasn't familiar with the requirements of the cement industry at that time, and the cement mills didn't know that the coal mines were using an inexpensive machine that they also could use to advantage.

Rubber in the process of manufacture is passed through rolls. Linoleum in the process of manufacture is passed through rolls. The blocks of wood from which the wood pulp used in the manufacture of paper is made are shredded in crushing machines. Wheat is milled by passing it between rollers, and flour mills, as you know, are occasionally blown up by a spark igniting the explosive mixture that results when fine flour dust is mixed with air—just such a spark as would be caused by a bit of metal falling with the grain into the milling machine. Here are a few examples of industries that might profitably employ the magnetic pulley to protect their plants, their machinery, or their product from injury. And yet it has taken ten years for knowledge of the magnetic pulley to spread to these other industries.

Isn't there something wrong with trade-journalism when a useful device, designed for one industry, but which could be profitably used by a score or more of other industries, remains for years unknown to these other industries and is then only discovered by chance?

I will tell you what I think is wrong. There is not enough co-operation among trade and technical journals. A trade-paper man is a specialist, and like all specialists, he is in a rut. He knows his own particular rut as, probably no other man knows it, but he knows nothing, or very little, of the other ruts—the other industries outside of the particular industry covered by the publication with which he is connected. His vision is microscopic—it ought to be telescopic as well.

Perhaps it is too much to expect one man to have both the intensive knowledge necessary to the conduct of a trade paper and the extensive knowledge without which he cannot hope to profit the industry he represents by the lessons to be learned from other industries; but surely it should be possible to so organize the staff of a trade or technical publication that some shall be microscopes concentrating on the industry covered by the publication, and some telescopes sweeping the horizon to discover what may be learned from other industries.

Take the men connected with a single trade or technical publication and you will find that even among themselves they are specialists, each with a certain function to perform, but with no comprehensive knowledge of the requirements of the other departments of their own business. What does the editorial department know of the requirements of the advertising department? What does the advertising department know of the requirements of the editors? Nothing! And yet each possesses, or should possess, knowledge that would be of service to the other.

SOLICITORS SHOULD BE INFORMATION-BEARERS.

For nine years I was advertising manager of a large manufacturing concern whose factory buildings covered two city blocks. Nearly every week two or three advertising solicitors connected with trade papers would drop in on me, talk advertising and go away again, sometimes with a contract, sometimes without. They were interested in just one thing—getting advertising for their publication. Although these men were traveling constantly, visiting thousands of plants in the course of a year, in many of which apparatus manufactured by the company with which I was connected must have been in use, they never brought me any information that I could use in my advertising—never a hint as to where an interesting installation of our apparatus might be found—never a photograph that I could use in my advertisements.

My problem was to prove the merits of the apparatus manufactured by the company that employed me. The evidence I wanted these advertising men might have obtained for me, because they were continually coming into contact with people who used our apparatus and who would have been willing to testify to its merits if they had been questioned concerning it. I couldn't ask them to do so, because I didn't know where they were, the product of our factory being sold mainly to other concerns that made the actual installations and who, when I approached them for information, refused to give it for fear that my object in seeking it was to solicit future business direct.

Here was a case where the advertising solicitor could, without much trouble to himself, have secured information that would have been very valuable to me, that would have put me under obligations to him, that would have made me welcome him with open arms whenever he turned up, and have made it simply impossible for me to refuse to advertise in his publication, and yet I cannot remember that in all of those nine years an advertising solicitor for a trade paper ever approached me with anything more helpful than a rate-card and a sworn statement of circulation.

SOME TRADE PAPERS LACK INTERNAL CO-OPERATION.

Now, these men were bright fellows, but they were in a rut—the advertising rut. They thought of nothing but getting more advertising for their publication. They were not interested in anything else. Sometimes I would take one of them through the factory and show him the various types of apparatus we manufactured and explain the uses of it to him, but, so far as I know, none of this information ever reached the editor of the publication, and yet there was one or more good stories in every department of that factory. I know that, because on the one or two occasions during those nine years when one of the editorial staff dropped in on me, he found lots to write about and would express surprise that they hadn't heard of these things before.

"Why, I told Soandso about that only a week or so ago," I would reply.

"Did you? Well, of course, we wouldn't hear of it through him. He's connected with the advertising end of the business."

You see! Even in your own organization there is a lack of co-operation between the various departments. Why should the

fact that I am connected with the advertising department of a publication prevent me from tipping the editors off to a good story when I run across one? Why, if I am connected with the editorial department, should I not study the advertising pages and, in the light of experience gained in visiting many factories, in the fullness of my knowledge concerning various industries, should I not dictate a letter to one of our advertisers and say:

"My Dear Sir: I wonder if you know that in such-and-such a factory in Cleveland there is an interesting installation of the apparatus advertised by you in the January 6 issue of our publication. It is used in connection with . . ." and so on.

Or this—"My Dear Sir: I notice that in your advertisement in our issue of January 6 you illustrate a piece of laboratory apparatus designed to indicate variations in atmospheric pressure and so constructed that a slight increase in the pressure for which the device is adjusted will close an electric circuit to a signal lamp. I am wondering whether, with slight modifications (such as the substitution of an alarm bell for the signal lamp), this device would not find a ready market in the coal fields of Pennsylvania and West Virginia, where, it would seem, such a device might be used to indicate the presence of a dangerous amount of coal-gas in the mines."

Whether the suggestion made could be acted upon or not, such a letter would certainly indicate a desire to be helpful, and it would go far towards proving what many of us doubt—that editors are familiar with the things advertised in their own publications.

The establishment of service departments to help the advertiser in the preparation of his copy has been tried by a number of trade and technical publications. These service departments have done much to increase the interest and typographical appearance of the advertising pages, and they are particularly useful to the small business which has not yet attained to the dignity of an advertising department of its own. But to the large users of advertising space—concerns big enough to have advertising departments of their own—most of them are of little value. And I will tell you why. The service department never succeeds in getting outside of the information furnished by the advertiser. The first request of the service department is for a copy of the manufacturer's catalogue and other printed matter. Out of this old material the service department fashions an advertisement, they revamp the old illustrations, they supply a decorative border, but this is the extent of their helpfulness.

This isn't what your advertiser wants. He can sponge and press his old suit himself; what he wants you to do is to make him a new suit out of material that he has not been able to obtain. And why should you not be able to do this? You are the clearinghouse for information relating to the trade or industry your publication represents. You know, or ought to know, more about the requirements of your particular field than any single manufacturer that caters to that field. You have the machinery for gathering information. You have the men capable of writing forceful English. You have a world of acquaintances, each possessing special knowledge which is yours for the asking. Give me the opportunity to use the facilities that already exist in the office of any well-conducted trade or technical publication and I will make the advertising pages as interesting as the reading pages. Why shouldn't I? What advantage will the editor have over me when I possess the same facilities that he has for gathering information, when I can use the same men for putting my stories into shape?

I foresee a day when the advertising pages of trade and technical publications will be as informative, as useful, as interesting as are the pages compiled by the editorial staff—when working side by side with the editor-in-chief will be an advertising editor, whose business it will be to pack the advertising pages so full of information of vital interest to readers of the publication that not a single page will be skipped—when, instead of a heterogeneous collection of unrelated fragments of information, advertisements bearing on the same subject or of interest to the same class of purchasers will be fused into homogeneous department bristling with information too valuable to be passed lightly by.

SELLING SPACE WITH A PLAN.

Let us profit by the experience of the dealer in real estate. The old method of selling city lots was to divide the land into spaces of a certain size, just as you divide your advertising pages, and to sell them to whoever would buy without restrictions as to the use that was to be made of them and without assistance from the dealer after the lots were sold.

Today when a new sub-division is opened, streets and pavements are laid, water and gas mains are run to the various lots ready for connection when the houses are built, saloons, stores and apartment houses are forbidden in the bill of sale, provision is made that no residence costing less than a certain amount shall be erected, all houses are required to be built on a given line at a certain uniform distance from the street, and after the lot is sold the dealer assists the purchaser with building plans and loans, so that the vacant land may be quickly covered with attractive homes, each unit fitting into the general plan, and the value of the unsold lots increasing as the barren land becomes transformed into an attractive residence section.

Compare this result to what happened under the old methods of selling real estate. The dealer was then interested only in finding a purchaser for the lots, just as you are now interested only in disposing of your advertising space at a profit. Every purchaser did as he pleased with his own lot, and the result was a hodge-podge of dwellings, neighborhood stores and apartment houses, big and little, cheap and expensive, attractive and unattractive, all jumbled together like the advertisements in your publications.

Now, the only difference between these two methods of selling, which produce such widely different results, is that in one case there is a plan, and in the other there is none. In the one case there is active and intelligent co-operation with the purchaser after the sale is made, and in the other the seller's interest in the transaction terminates when the purchase price is paid. If this is good policy in the real-estate business, where the same customer is seldom in the market for a second lot, why should it not be good policy in a business where the same space can be sold to the same customer week after week, month after month and year after year?

ADVERTISING MUST PAY, TO BE PERMANENT.

Let me sum up in a few words the substance of what I have said. It seems to me that if trade and technical publications are to give their advertisers the help that the advertisers need, and which, I believe, they deserve (because without the revenue derived from advertising the trade press would dwindle to insignificant proportions), you must recognize the fact that the only advertising that is permanent is advertising that pays the man who pays the bills, and you must put the whole power of your organization squarely back of your advertisers. You have not done enough when you place at the disposal of the advertiser a specified amount of space for a stipulated sum.

Ninety per cent of the advertising that appears in magazines of general circulation is placed through advertising agencies. Do you know why? It is because advertising agents have learned that the purchase of space, the writing of copy, the making of illustrations are not the vital factors in the success of an advertising campaign. Success depends upon the knowledge of trade conditions, upon the accuracy with which the demand for the articles advertised can be estimated in advance and the degree of competition to be overcome foretold.

Twenty-five years ago the advertising agent was a mere broker in space, just as the majority of trade and technical journals, so far as their advertising departments are concerned, are mere merchandisers of space today. But the advertising agent learned that it was not good policy to talk a man into spending a certain sum of money and leave him to spend as he saw fit. The result was too often disastrous and the cost of creating new customers each year too heavy to be borne. And so it came about that the advertising agent developed from a space-broker and copy-writer into a merchandising expert, and it is because of the possession of this expert knowledge that he today controls the expenditure of the vast sums of money spent yearly in general advertising.

How has the advertising agent acquired this knowledge that enables him to intelligently advise a client as to the conduct of the client's own business? Partly because, while the client is familiar with his own business only, or, at best, with business conditions in his own line of trade, the advertising agent, handling a large number of accounts, each pertaining to a different industry, has had opportunity to get a more comprehensive review of trade in general, and has learned from each account that he has handled facts that assist him in arriving at a correct conclusion regarding the problems presented by other accounts. Supplementing the knowledge that has come to him in this way, the advertising agent employs investigators to collect the trade data necessary to the proper formulation of the advertising and merchandising campaign, and when he lays his plan before his client he knows more about conditions affecting the client's business than the client himself knows.

Knowledge inspires confidence, and confidence begets business. What the advertising agent has done you can do, for there is no ad-

vertising agency in the country that possesses the facilities for collecting the facts pertaining to a given industry that is possessed by the trade or technical journal devoted to that industry. But this splendid machinery that is always at your disposal is being used for the benefit of your subscribers only.

My suggestion is this: If you want to be of real service to your advertisers begin with your editorial department and say to the editor and every man that works under the editor's direction: "From now on you have two duties to perform—first, to gather the news of the trade for our readers; second, to collect data that will be useful to our advertisers."

And I would say to those connected with the advertising department: "As you travel through your territory keep your eyes open and report on anything you see that would be of value to the editors, or that would be of interest to any of our advertisers, or any possible advertisers, whether located in your territory or not."

Huxley has said that before we can know *everything* concerning so simple a thing as a glass of water we must unravel all the riddles of the universe. An isolated fact is of little value in itself, but collated with other facts it gives us the basis of a science. Advertising and merchandising are still too much matters of guesswork. The greatest service that you can render your advertisers is to use for their benefit the splendid facilities you possess for collecting information.

How many electric irons selling at an average price of three dollars each can be disposed of in a city where ten thousand homes are wired for electricity and the average price of current is ten cents a kilowatt hour? No man living can answer that question, nor is it likely that any electrical publication could gather all the facts necessary to answer it with certainty. But it is possible for such a publication to collect, little by little, important data bearing on the sale of electrical appliances for the home, and on this foundation to construct an advertising and merchandising campaign that would command the respectful attention of every manufacturer of such appliances.

The most illuminating investigation ever made of the automobile industry was not the work of an automobile journal but of the *Saturday Evening Post*. And so far as I am aware, no sporting-goods trade journal has as yet noted the fact that the rapid development of irrigation projects in Texas has created in that state new and profitable markets for rowboats and canoes.

Is it not possible that the trade and technical publications are devoting too much attention to the easy task of chronicling events after they have occurred, and are shirking the heavy labor of digging for data not easily obtained, but which would be of vital interest to the merchants and manufacturers who advertise in our trade press?

Milwaukee Gets New Rates

Reduction in telephone rates in Milwaukee, ordered several months ago by the Wisconsin State Commission, have become effective. According to estimates made by the Wisconsin Telephone Company, a yearly saving to patrons will amount to about $200,000.

The two-party residence service is reduced 25 cents a month. The former rate was $3. Four-party residence unlimited will be discontinued soon. Residence coin box service, one-party lines, have been reduced from 10 to 9 cents per day. Excess calls are reduced from 3½ cents to 3 cents. Two-party lines pay ¾ cent less per day for local calls and excess calls are reduced 1 cent each. In the case of four-party residence slot service, excess calls have been reduced from 5 to 3 cents each.

Four-party measured service, a new class of residence service, becomes effective. In this service the subscriber guarantees $24 per year for 730 local pay calls or less, with excess pay calls at 3 cents each. This makes a gross rate of $2.25 per month, or $2 net.

Residence unlimited service, two party, is reduced from $3.50 and $3 per month to $3 and $2.75 per month.

In the business unlimited service, one-party, a reduction from $8 to $7.25 per month is made. Other changes in business service follow:

Business measured service, one-party, reduced from $4.17 a month to $3.90.

Business nickel coin box service, one-party, from 15 cents a day for three local pay calls or less, with excess calls at 3½ cents each, to 13½ cents per day, with excess calls at 3 cents each.

Business nickel coin box service, two-party, from 10 cents a day for local pay calls or less, with excess calls at 4 cents each, to 9 cents a day, with excess calls at 3 cents each.

Business nickel coin box service, four-party, from 7½ cents a day for one and one-half local pay calls, with excess calls at 5 cents each, to 6¾ cents a day, with excess calls at 4 cents.

Old Omaha Independent May be Sued

Individual stockholders of the old Independent Telephone Company of Omaha may be sued for twice the amount of their stock up to the sum of $1,462,524, according to a deficiency judgment rendered against the company by Judge Woodrough in United States Court. The suit was filed by the Title Guarantee and Trust Company of California as trustee for bondholders and unsecured creditors of the Independent Company.

The decision recalls that on April 20, 1912, the Independent telephone property was sold for $1,000,000, the proceeds being applied on the debt of $2,862,524.30, leaving a balance of $1,862,524.30. Later, another $400,000 was paid on the property, leaving the unpaid debt at $1,462,524.30, for which amount the Title Company brought suit against the defunct company.

Lysle Abbott, receiver for the Independent Telephone Company, said:

"Under the Nebraska laws stockholders are liable for the par value of their stock, and if they paid less, the creditors can recover the difference.

"The Independent telephone stock was given away with the bonds, no cash being paid for any of it.

"The books of the Independent Company disappeared some years ago. So far as known there is no list of the stockholders extant. Nor do we know the amount of stock that was issued. The first thing these unsecured creditors will have to do to get any benefit out of this judgment is to prove that some fellow owns stock. Then they must prove that he didn't pay for it. After this they must show he now has property and then they must get judgment and get hold of that property."

Augusta Vehr, American Electrical works and other creditors have $1,462,524 still due them from the old Omaha Independent Telephone Company, according to the decision by Federal Judge J. W. Woodrough.

Kansas Merger in Prospect

A merger of the two telephone systems in Lawrence, Kas., the Bell and the Home, is proposed and has the approval of the city officials and many citizens. It is proposed to effect the consolidation by the sale of both systems to W. P. Hemphill of Kanss City, who merged the two exchanges in Ottawa. Both companies claim they are operating at a loss, and that the merger will eminiate dual office expenses and permit better service at the same rates.

Fred Jackson, assistant attorney of the Kansas utilities commission, has conferred with the city officials and the representatives of the companies in regard to the consolidation.

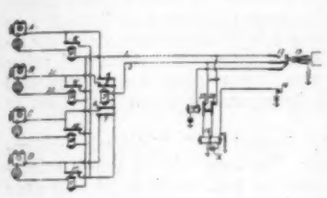
Telephone Patents Issued Recently

A Brief Digest of those Current Specifications Most Interesting to Telephone Men

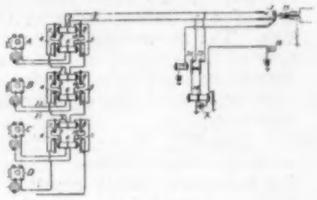
BY DAVID S. HULFISH

NO. 1,182,138. Receiver Head Gear. Issued to J. O. Bradley, New York, N. Y. Two watch-case receivers are arranged upon a clamping spring to fit upon the ears and the clamping spring carries also a terminal block which will fit the ordinary receiver hook so that the head gear may he made a part of an ordinary telephone set, and operate the hook lever as a hand telephone would.

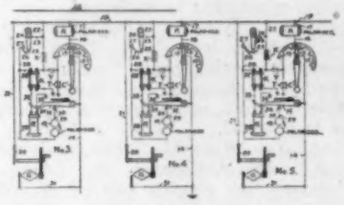
1,182,302. Transmission System. Issued to Giuseppe Musso, Vado, Italy. For speaking over lines of high capacity, the transmitter is in a local circuit containing battery, induction resistance and transmitter, the inductive resistance being shunted by non-inductive resistance with series condenser. The live wires are at the transmitter terminals, without induction coil. The "kick" of the inductive resistance furnishes the chief transmitting power.



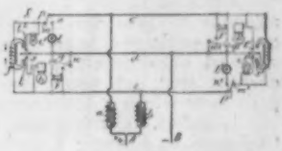
1,185,086.



1,185,087.



1,185,938.



1,186,305.

1,182,363. Selector Switch. Issued to O. T. Forsberg, assignor to Western Electric Company, New York, N. Y. Selector brushes drop by gravity along a vertical row of tags, and are permitted to make long or short steps by means of a magnetic escapement device.

1,182,538. Linefinder Switch. Issued to A. H. Dyson, assignor to Western Electric Company, New York, N. Y. A calling line may be engaged by a single mechanical movement, the moving brushes being arranged to move all at the same time to engage all the lines in the switch.

1,182,932. Party-Line Selector. A pair of polarized relay at each telephone of a party line controls the ringing and speaking circuits and selects by means of a ratch device. Each telephone has a hand generator and a polechanger for selection in calling another station.

1,182,996. Trunk Circuit. Issued to S. A. Beyland, and H. L. Harris, assignors to Garford Manufacturing Company, Elyria, Ohio. A trunk between a main office and a branch office may be held by a key at the branch office, the holding key being combined with the ringing key. While the branch rings a local telephone, the "exchange is held."

1,183,214. Automatic System. Issued to A. E. Lundell, assignor to Western Electric Company, New York, N. Y. Short interruptions in the calling loop control on automatic selecting switch and long interruptions control a releasing relay.

1,183,821. Call Locating System. Issued to T. G. Martin and J. Erickson, assignors to First Trust and Savings Bank, trustee, Chicago, Ill. (Application filed December 6, 1906.) Fire alarm lines and other lines as desired in an automatic exchange are so wired that when called the calling line cannot release the switches used. A central office attendant releases them, after making note of the numbers of calling and called lines.

1,183,832. Release System for Automatic Exchange. Issued to John Erickson, assignor to First Trust and Savings Bank, trustee, Chicago, Ill. (Application filed January 22, 1907.) In the thru-wire Strowger, the bridges at the selectors are cut off while speaking, and are restored later for release.

1,183,875. Repeater Circuit. Issued to R. V. L. Hartley, assignor to Western Electric Company, New York, N. Y. In a thermionic repeater circuit, an auxiliary circuit between output side and input side makes the input side neutral to output currents.

1,183,890. Trunking System. Issued to A. E. Lundell, assignor to Western Electric Co., New York, N. Y. A signal-lamp circuit is controlled by the calling end, a ringing circuit is controlled by the called end, and a third circuit and switch are controlled by the first two circuits jointly.

1,184,001. Loading Coil. Issued to W. Merz, assignor to Western Electric Company, New York, N. Y. When a phantom line is loaded, effort is made to influence the thru circuits. In this coil, the turns in each conductor are unequally distributed upon the core.

1,184,020. Switch-Stopping Device. Issued to J. N. Reynolds, assignor to Western Electric Company, New York, N. Y. A magnet throws a stop-dog into ratchet teeth to stop the brushes of a power-driven switch.

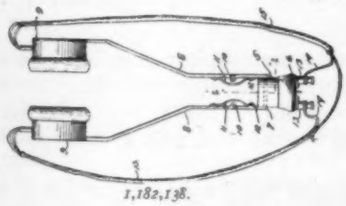
1,184,162. Selector Switch. Issued to G. A. Betulander, assignor to Betulander Automatic Telephone Company, London, England. The moving brushes fall by gravity, are stopped by a magnet at a selective position and are restored magnetically. Devices also permit lifting the brushes from their contact tags.

1,184,163. Automatic System. Issued to G. A. Betulander, O. Grahn and N. G. Palmgren, assignors to Relay Automatic Telephone Company, London, England. Selectors are not permanently attached to trunk lines. When a trunk line is taken, a selector then connects with the trunks.

1,184,741 and 1.184,742. Metering Circuits. Issued to C. L. Goodman, assignor to Western Electric Company, New York, N. Y. In an automatic exchange, certain lines are designated as "free" lines and do not operate the service meter of the calling line where a "free" line is called.

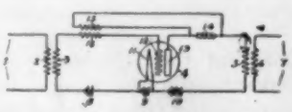
1,185,086 and 1,185,087. Party Line Lockout. Issued to C. L. Goodrum, assignor to Western Electric Company, New York, N. Y. Lockout relays are used, not at telephone nor central office, but at the branching point of the lines.

1,185,331. Telephone System. Issued to M. L. Johnson, assignor to Frank B. Cook Company, Chicago, Ill. In a semi-automatic exchange, speech recording devices are connected to the calling lines as a preliminary operation.



1,182,138.

1,182,302.



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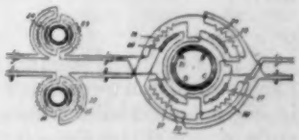

1,184,001.

1,185,372, 1,185,373, 1,185,374, 1,185,375, and 1,185,376. Telephone Systems. Issued to E. R. Corwin, assignor to Frank B. Cook Company, Chicago, Ill. Semi-automatic systems in which a double series of pre-selectors is used, party lines are provided for, and lines are grouped in groups of five hundred lines per group.

1,185,472. Repeater. Issued to S. G. Brown, London, Eng-

land. Two voice relays at the repeating station each are connected to receive speech. When either receives speech, the local amplified currents operate a local relay which cuts out the other voice relay and completes a circuit for transmitting the received speech, amplified.

1,185,510. Linefinder System. Issued to A. E. Keith, assignor to Automatic Electric Company, Chicago, Ill. (Application filed June 28, 1911.) The plungers of a Keith line switch return at one movement, and reach always in one direction for idle trunks. A spring drives the master arms, and a solenoid restores them.

1,185,521. Common Battery Automatic System. Issued to T. G. Martin, assignor to First Trust and Savings Bank, trustee, Chicago, Ill. (Application filed May 2, 1905.) A stronger system in which talking battery is fed to the line through the vertical and rotary relays of the final connector.

1,185,522. Automatic Trunk. Issued to T. G. Martin, assignor to First Trust and Savings Bank, trustee, Chicago, Ill. (Application filed May 29, 1906). A trunk between offices may be used in either direction, having a selector at each end.

1,185,635. Party Line Connector. Issued to Gerald Deakin, assignor to Western Electric Company, New York, N. Y. In an automatic exchange, a connector serving party lines may be reached of different paths, and the character of the ringing current sent out upon the selected line is determined by the path over which the connector is reached.

1,185,843. Combination Key. Issued to M. Setter, assignor to American Electric Telephone Company, Chicago, Ill. (Application filed June 6, 1906.) A party line ringing key of several buttons is combined with a listening key. The operation of the listening key releases the depressed ringing button.

1,185,938. Party Line. Issued to Casper L. Redfield, Chicago, Ill. (Application filed February 13, 1905.) Each telephone has a ratchet wheel, a driving magnet and pawl, and a "guard" for restoring. At the selected station the magnet is rendered inoperative in the course of operations, while others continue acting, interpose their guards and then are restored.

1,186,057. Low Circuit. Issued to C. S. Winston, assignor to Kellogg Switchboard & Supply Company, Chicago, Ill. An lines, giving a different test when the station called for is upon operator's manual cord pair with reverting busy test for party the line calling for it.

1,186,305. Private Line System. Issued to E. A. Graham, W. J. Rickets, and E. A. Sauftleben, Brockley, London, England. A three-wire private line with one battery feed upon the line common to both telephones. The speaking circuits are the equivalent of two earthed circuits, one for transmission in each direction.

1,186,462. Measured Service System. Issued to B. D. Willis, assignor to Automatic Electric Company, Chicago. (Application filed August 5, 1910.) In connection with a Strowger exchange, a coin collector for different sizes of coins is placed at the telephone and the number pulled upon the dial adjusts the coin device and determines the size of coin required to be deposited.

1,186,464. Meter System. Issued to Garrison Babcock, Rochester, N. Y. (Application filed February 17, 1910.) The winding of a polarized relay at the calling telephone is included in line. The answering of the calling telephone reverses the direction of the current upon the calling line and the polarized relay shunts its own winding from the line and sets a mechanical counter so that the counter will be operated when the hook is depressed.

1,186,471. Searching Switch. Issued to J. Erickson, assignor to Automatic Electric Company, Chicago, Ill. A trunk selecting automatic switch remains upon the last trunk used and may be moved to and fro over the terminals, searching over different sets of terminals in its two movements.

1,186,484. Automatic Pay Telephone. Issued to F. Lubberger, assignor to First Trust and Savings Bank, trustee, Chicago, Ill. (Application filed October 18, 1906.) The automatic telephone has a coin-collecting box attached. Long distance operator may be called without paying but any other call requires the deposit of a coin before conversation may be had.

MINNESOTA TELEPHONE NEWS

BY THE MINNESOTA INDEPENDENT TELEPHONE ASSOCIATION

326 McKnight Bldg., Minneapolis, Minn.

GOOD NEWS ON THE DEPOT TELEPHONE SERVICE SITUATION.

THE following letter from the attorney general's office to the Commission is of vital interest to many of the telephone companies throughout the state:

July 6, 1916.

RAILROAD AND WAREHOUSE COMMISSION: Your letter of June 15, 1916, addressed to Attorney General Lyndon A. Smith has been referred to me to answer.

You state that several of the railway companies have contracts with telephone companies for free telephone service in their depots similar to the form of contract which you enclose. You ask for an opinion upon the validity of this contract. I am of the opinion that said contract in effect provides for free telephone service and is therefore in contravention of Section 11, Chapter 152, Laws 1915.

You also request an opinion upon the question of whether the Commission can order a railway company to have a telephone of a local telephone company installed in the depot of the railway company at the prevailing rates where the facts warrant. This question should, in my opinion, be answered in the affirmative.—HENRY C. FLANNERY, Assistant Attorney General.

This opinion means also that the telephone companies must get rental for depot telephones, where there is merely a verbal agreement or letter from the railroad authorizing the company to install the telephone without charge or rental to the railroad.

Those companies now giving this free service or under some one-sided agreement whereby the railroad really gets the service free, should notify such railroad through its local agent in writing that if the telephone is not paid for from now on at the regular business rental rate, same will be removed and complaint made to the commission by the telephone patrons to have it reinstalled on the paid basis. Here is the section of the law as referred to by the assistant attorney general:

Sec. 11. *Free or Reduced Rates to Officers, Etc.*—A telephone company may furnish service free or at reduced rates to its officers, agents or employes in furtherance of their employment, but it shall charge full schedule rates without discrimination for all other services. Provided that nothing herein shall release any telephone company from carrying out any contract now existing between it and any municipality for the furnishing of any service free or at reduced rates. Provided further, that any contract for telephone service, at discriminatory rates, other than those with municipalities, shall be terminated by the company as soon as the same becomes terminable by its terms, or if the company has the option to terminate such contract, said option shall be exercised and the contract terminated within three months after the passage of this act.

One of the railroads, the Great Northern, has recently agreed to install a telephone in each of its depots, upon complaint of the telephone patrons to the commission, at Hewitt, Waverly and Montrose, and pay the regular business rental rate.

The association is doing everything possible in an effort to compel the railroads, if they will not agree otherwise, to place a telephone in every depot in the state where there is an exchange and pay the business rates.

Several of the companies not having depot service have been supplied with petitions to the commission, including Hewitt, Waverly and Montrose and it is believed that in every case where the railroad has heretofore refused to subscribe for telephone service the petition will have the desired effect.

The association will, upon request, be glad to make up and send one of these blank petitions to any company.

LAKE CITY TOLL RATE COMPLAINT DISMISSED.

A hearing was held June 29 before the commission at the capitol upon the complaint of the Lake City Commercial Club that the toll rates as charged by the long distance companies between Lake City and the Twin Cities was high. Lake City was represented by R. C. Tenant, D. L. Mills, D. C. McKenzie and G. M. Dwelle; the Northwestern Telephone Exchange Company by G. H. Pratt, M. L. Lane, and E. A. Prendergast; the Tri-State Telephone and Telegraph Company by C. B. Randall. After some argument the case was dismissed, the city and toll line companies agreeing to change the rate from a one to two minute basis, effective July 15. The old rate was 25 cents for one minute, 15 cents each additional minute, while the new rate is 30 cents for two and 10 cents for each additional minute.

COMPLAINT OF THE RED LAKE EASTERN MARSHALL FARMERS TELEPHONE COMPANY AGAINST THE EASTERN DEVELOPMENT TELEPHONE COMPANY FOR DISCRIMINATION IN TELEPHONE RATES IN THE VILLAGE OF GOODRIDGE, PENNINGTON COUNTY.

A hearing has been ordered in this complaint to take place before the commission in the Commercial Club rooms at Thief River Falls, on Thursday, August 3, at ten o'clock. Notice of the hearing has been served on the interested parties.

AITKIN (Lone Lake): At the recent annual meeting of the Lone Lake Telephone Company, the following officers were elected for the ensuing year: President, Gust Malmgren; vice president, W. E. Griffeth; secretary and treasurer, Gust West.

LEWISTON: The Lewiston Telephone Company has disposed of the electric light plant to parties at Mankato.

LAKE PARK: The stockholders of the Lake Park Telephone Company at its recent meeting, elected the following officers: President, Owen Wangensteen; secretary, A. K. Torgerson; treasurer, W. J. Norby.

LAWRENCE (Wahkon): The Telephone Company at this place at its recent meeting elected officers as follows: President, H. Weaver; secretary, E. W. Brown; treasurer, A. Mann.

WOLVERTON: The Farmers Club expects to organize a co-operative telephone company.

DENT: The interests of Herman Lewin, and Lutie Loop in the Dent Telephone Company were recently sold to other parties.

PILLAGER: The Crow Wing Valley Farmers Telephone Company has been incorporated. The line runs from Pillager to Motley.

ROYALTON: The Northwestern Telephone Exchange Company is now rebuilding in the village.

HOUSTON: The farmers of Corey Valley recently held a meeting and discussed the possibility of forming a telephone company and building a line into Houston. A committee was appointed consisting of E. Kingsley, J. A. Johnson and Clark Corey.

BORDER: The Border Co-operative Telephone Company is planning to extend its lines very soon.

LITTLE FALLS: The council has granted the Northwestern Telephone Exchange Company permission to lay its cable underground on First street.

LYNCH (Grand Marais): The Lynch Telephone Line which connects with the summer resort by that name on Gull Lake with Ozonite Camp at Nisswa, has been purchased by Baker Seeton and Company and S. V. Long.

BEMIDJI: The Northwestern Telephone Exchange Company has extended its line to Federal Dam, and connections with that place will be established very soon.

BRECKENRIDGE: The Breckenridge Telephone Company is now at work getting out a new directory which will be issued very shortly.

LONG PRAIRIE (Germania): The Germania and Moran Telephone Company recently held its annual meeting and elected the following officers: President, F. H. Eberhardt; secretary, R. Kassube, and treasurer, H. Aspengren.

ELLENDALE: Announcement is made by F. J. McDonald, the new owner of the local telephone company, that the farmers' line will be extended to Hope in the near future.

PRESTON: The Waukokee, Prairie Queen and Preston Telephone Companies are considering the rebuilding of their lines.

PARK RAPIDS: At the recent meeting of the Park Rapids and Itasca Park Telephone Company, the following officers were elected: President, F. M. Shepard; vice president, Theodore Wegman; secretary and treasurer, W. M. Taber.

TRACY: The Northwestern Telephone Exchange Company now has a crew at work in this city laying conduits for the underground portion of its new system which will be installed this summer.

SACRED HEART (Wang): At a recent meeting of the East Wang Telephone Company, the following officers were elected: President, T. J. Opdahl; vice president, A. T. Kjersten, and secretary, G. O. Jgevre.

DASSEL: At the recent annual meeting of the Dassel and Collinwood Telephone Exchange Company, the following officers were elected for the ensuing year: President, Edward Hardy; vice president, Simon Osler; secretary, Olaf Anderson.

DEXTER: The Dexter Telephone Company held its annual meeting a few days ago and elected the following officers: President, L. Larson; secretary and treasurer, T. L. Woodford; manager, A. McDowel.

ORTONVILLE: A new telephone company has just been organized and will build a line east of here. It is known as the Ortonville and Odessa Telephone Company.

ISLE: The Hay Brook Farmers have recently held a meet ing and decided to build a line into Isle.

NEVIS: It is reported that E. L. Harmer of Park Rapids has bought considerable stock in the Nevis Telephone Company and will be in charge of that company and the light and power plant very soon.

FEDERAL DAM: A new telephone line is being built from here to Bena.

CLARKFIELD: At the recent annual meeting of the Clarkfield Telephone Company, the following directors were elected: H. P. Andrisen, George J. Piersol, W. C. Crough, I. F. Fagerlie. Mr. Fagerlie is secretary of the company and M. C. Hornbeck manager.

ISLE: The annual meeting of the east side telephone company was held recently and the following officers were elected: Anton Swedberg, president; Andrew Larson, vice-president, and Victor Peterson, secretary and treasurer.

HINCKLEY: At the recent annual meeting of the Farmers Co-operative Telephone Company, James Hauley was re-elected president.

HUBBARD: The following officers were elected at the recent annual meeting of the local telephone company: President, W. A. Doran; vice-president, George Rutherford; secretary, L. L. Shoves, and treasurer, J. S. Hinds.

BRAINERD: One of the Minnesota Telephone Company's toll circuits to Cove and Onamia was recently ordered reconnected with the Northwestern Telephone Exchange Company's local exchange by the commission. It was disconnected by the Minnesota company on the claim of poor service, but upon complaint by the Northwestern company, the commission issued the order on the grounds that where a connection was once established it should not be disconnected without authority to do so.

BELLE PLAINE: The Citizens Company recently bought about three miles of rural line from the Carver Telephone Company southwest of here and now the subscribers on that line connect at Belle Plaine instead of Carver.

FAIRMOUNT, N. D. The Northwestern Telephone Exchange Company has sold to the Fairmount Telephone Company, one of its rural lines east of this place in Minnesota.

HOPKINS: The Northwestern Telephone Exchange Company is planning on giving service at Clear Lake and Williston Park.

ST. WENDELL (Avon): The St. Wendell Rural Telephone line is about completed.

The Kanabec County Mutual Telephone Company has purchased, or consolidated the Central Knife Lake Telephone Company, Snake River Telephone Company, Mayflower Telephone Company and North Comfort Telephone Company. These companies owned and operated rural lines in Kanabec county.

An audit of the La Crosse (Wis.) Telephone Company for the last six and a half years shows that in that period the company has more than doubled its number of subscribers and has accumulated a handsome surplus of undivided profits.

Of Interest to the Trade

What the Telephone and Accessory Manufacturers Are Doing to Advance the Art

Compact Western Electric Rural Telephone

A new type of rural telephone is of more than passing interest to telephone men who are concerned with what is being done to improve service conditions. This interest has been evidenced in the rapidly growing popularity of the No. 1317-Type C magneto telephone that was introduced to the trade a short time ago by the Western Electric Company, Incorporated.

Compactness is the outstanding feature of the Western Electric No. 1317-Type C telephone. The familiar No. 1317 set has been so redesigned that all three dimensions have undergone a substantial reduction. These reductions have been made possible in part by a partial rearrangement of the apparatus in the interior of the cabinet. A further reduction in depth has been effected by the use of a transmitter mounted upon a short bracket instead of a long arm, while a change in the angle of the writing shelf has done the rest.

The principal dimensions of the new and old No. 1317 telephones compare as follows: Width of cabinet, 8 inches for the new against 9¼ inches for the old; width over all, including switchhook, 10¾ inches for the new against 11½ inches for the old; height over all, 19 inches for the new against 20½ inches for the old; depth of cabinet, 4¾ inches for the new against 5¾ inches for the old; depth from tip of writing shelf to back of cabinet, 7¾ inches for the new against 12¼ inches for the old; and depth over all, 8¾ inches for the new against 14¼ inches for the old.

The cubical content of the space required for the new telephone is therefore only 1,787 cubic inches as compared to 3,360 inches for the old, a saving of practically 47 per cent. The saving in storage space effected by the use of the No. 1317-Type C telephone is at once apparent. This coupled with the fact that the telephone is packed one per box is of considerable advantage to the telephone company.

The smaller cabinet, the short arm transmitter and the use of the powerful three-bar No. 50 generator have the further effect of reducing the total weight. Whereas the old No. 1317 type weighed 27⅛ pounds, the new Type C telephone weighs only 18⅝ pounds, a saving of almost 33 per cent. This lighter weight is important to the telephone company, as it substantially reduces freight and handling charges.

The writing shelf on the No. 1317-Type C telephone is a distinct innovation and one which is bound to be recognized as an excellent feature. On the old type of telephone the angle of writing shelf to the face of the cabinet was 71 degrees. On the Type C it is only 30 degrees. With the arrangement in vogue up to the adoption of the Type C telephone trouble was likely to be experienced as the result of telephone users leaning heavily on the writing shelf while carrying on a conversation. A repeated strain of this kind will frequently tear the telephone from its fastenings on the wall and also do considerable damage to the instrument itself. It is impossible to lean on the writing shelf of the new telephone sufficiently to tear it from the wall. The shelf can therefore be used for the purpose for which it is intended—writing. Actual service tests have also proven the new angle to be one that will permit of perfect comfort and convenience in writing while talking.

The external fittings of the No. 1317-Type C telephone are finished in black. This produces a better appearing telephone. From the standpoints of durability and serviceability, the black finish has a distinct advantage over the nickel. Many telephone users are in the habit of placing the palm of the hand over the telephone gongs in order to deaden the sound of the ringing. In time the nickeled gongs begin to look

New Compact Telephone No. 1317-Type C.

The Instrument Closed.

Writing Shelf in Use.

brassy, due to the rubbing and the perspiration acids. The use of the black finish effectually reduces the possibility of brassy gongs.

The rearrangement of the apparatus in the body of the cabinet has been done in such a way as to avoid any lessening of the accessibility of the parts in spite of the fact that the cabinet is smaller. All of the other excellent features of the old No. 1317 type telephones have been retained. The flexible cable connecting the apparatus on the door with that on the interior of the telephone is armored with a steel wire spiral. Screw type terminals are used throughout. They are plainly marked and visible when the door of the set is opened. Three hinges are used on the door and are electro-galvanized to prevent rusting. There are no terminals on the outside of the telephone. The outside of the cabinet is quarter-sawed oak with a high, hand-rubbed finish and the inside given a protection shellac finish. A comprehensive wiring diagram is placed on the door of every telephone.

The new No. 1317-Type C telephone because of its compactness and the simplicity of its exterior, coupled with the black finish fittings, is peculiarly adapted to residence use. It is unobtrusive and will fit in anywhere. It represents a distinct advance in telephone design.

Kellogg Booklet on Lantern Slides

Another novel and interesting booklet has been received from the Kellogg Switchboard & Supply Company. This little book of forty-eight pages illustrates some new and old lantern slides offered by this progressive company. The illustrations show the slides in actual size and, therefore, the book is just a little bit larger than an ordinary glass lantern slide.

"More Subscribers at the Movies" is the title. From the cover design, which shows the attractive "subscriber," to the last page, the book is filled with

More Subscribers at the Movies
The best way to get them—is to use Kellogg Lantern Slides and
Install Kellogg phones in the homes
Kellogg Switchboard & Supply Co.
KANSAS CITY, MO. CHICAGO SAN FRANCISCO, CALIF.

A new Kellogg Booklet

slides extremely well illustrated and each carrying a forceful, terse argument on the almost numberless advantages of being a subscriber.

A big feature of these illustrations, which, by the way, are also offered by the Kellogg Company in the form of printing plates, is that they are well drawn and carefully and accurately made. Chapters in the book cover general subscriber campaigns, long distance business, extension sets, etc. This is a book well worth the time it takes a telephone man to write for it. Copies will be sent from the main office of the Kellogg Switchboard & Supply Company at Chicago.

Stromberg-Carlson Puchases Garford Business

The Stromberg-Carlson Telephone Manufacturing Company has taken over and consolidated with its own business at Rochester the entire telephone business of the Garford Manufacturing Company. The telephone business of both concerns will be conducted under the name and management of the Stromberg-Carlson Company. The company has taken over all unfilled orders and contracts that were on the books of the Garford Company and deliveries of such orders will be made either from the factory at Rochester, or from branch houses at Chicago, Toronto or Kansas City. The Garford Manufacturing Company was successor to the old original Dean Electric Company, which was organized and started in business in 1904 and enjoyed a good Independent telephone business. The Stromberg-Carlson Telephone Manufacturing Company is and have always been a bulwark of strength in the Independent manufacturing field. Organized in the early days of the Independent industry it has steadily increased and grown until today it is one of the largest concerns of the kind in existence. The sales and engineering forces of the Garford Manufacturing Company were taken over by the Stromberg-Carlson Company. The individuals and positions they occupied with the Garford Company are as follows: George A. Scoville, sales manager; Ray H. Manson, chief engineer; Sidney Beyland, assistant chief engineer; Frank Slough, engineer; H. L. Harris, sales engineer; Hall T. Glessner, sales engineer; the road salesmen, and A. V. Overshiner, advertising manager.

The switchboard and installation departments of the Garford Company have also been merged with like departments of the Stromberg Company, as well as a portion of the trained men from telephone and other departments of the Garford factory. The Kansas City branch formerly conducted by the Garford Company will be continued as a Stromberg-Carlson distributing point. A. J. Roberts, who has had charge of that branch, will continue as its manager in the employ of the new owners.

The combined engineering, sales and manufacturing facilities of the greater Stromberg-Carlson Telephone Manufacturing Company will doubtless produce greater efficiency and economy in the production and distribution of telephone apparatus which will prove beneficial to the former customers of the Garford Company as well as customers of the Stromberg-Carlson Company. This purchase will without doubt prove helpful in many ways to Independent telephony. Independent operators will feel secure in the knowledge that the manufacturing end of the business is on a substantial basis and can be relied upon. The purchase price as paid by the Stromberg-Carlson Company was something like $500,000, which is about as substantial evidence as any one would want of its faith in the future of the Independent telephone business.

"Advertising That Pays"

The Stromberg-Carlson Telephone Manufacturing Company has published a little booklet under the above title that has to do with moving picture advertising for telephone operating companies. Six styles of slides are shown and particulars given. Those who are interested should write for a copy. It will be promptly mailed and no one can help but be interested.

A Combination for Better Signaling

The new compact No. 1317 Type "C" telephone that has been recently announced to the trade by the Western Electric Company, Incorporated, contains two exceptionally noteworthy features in its generator and ringer.

The generator is a three-bar instrument known as the No. 50 type. It has been developed practically as the result of the agitation of the past few years for doing away with extra long heavily loaded lines. In certain states the length of telephone lines has been limited by the action of public service commissions. Furthermore, experience has shown that long, heavily loaded lines are unwieldy for commercial purposes and satisfactory service cannot be given to subscribers. Such a line is always sure to be in use, while several parties are waiting to make a call.

The No. 50 three-bar generator has been designed to fill the demand for a generator capable of operating satisfactorily on short moderately and heavily loaded lines of commercial length. It is claimed that it is electrically powerful enough to operate all of the bells on 90 per cent of the magneto telephone lines now in service and equipped with five magnet generator sets.

A further advantage to be gained by the use of this generator lies in the fact that it makes the telephone company's subscriber station equipment more flexible.

Ringer of the New Telephone.

Telephones equipped with this instrument, which will work equally well on short moderately and heavily loaded lines, are interchangeable. They can be taken out of one class of line and installed on another.

The following set of seryice data will give a clear idea of the signaling capabilities the No. 50 three-bar generator. The figures are all based on signaling over a line of No. 12-BB iron wire in fair condition.

The generator will ring:

32	2500-ohm	telephones	over	a	15-mile	metallic	line
25	1600-ohm	telephones	over	a	15-mile	metallic	line
20	1000-ohm	telephones	over	a	15-mile	metallic	line
25	2500-ohm	telephones	over	a	20-mile	metallic	line
15	1600-ohm	telephones	over	a	30-mile	metallic	line
10	2500-ohm	telephones	over	a	60-mile	metallic	line
10	1600-ohm	telephones	over	a	50-mile	metallic	line
10	1000-ohm	telephones	over	a	40-mile	metallic	line

If the lines are in perfect condition electrically, the No. 50 generator can be used to ring approximately 20 per cent more telephones.

Other features of this generator are similar to those of the heavy duty Western Electric No. 48 five-bar generator. The armature is normally short-circuited to protect it from lightning. Turning the crank connects the generator on the line. The crank is made in one piece and the armature turns easily and without jerks. The magnets are of special steel hardened so as to retain their strength indefinitely. The bearings are large and substantial.

A "non-freezing" ringer that actually does not

Generator of the No. 1317 Telephone.

"freeze" or "stick-up" forms the second half of the signaling combination of the No. 1317 Type "C" magneto telephone.

One of the most frequent of ringer troubles is caused by the sticking of the armature. Two things may be responsible for this. Residual magnetism in the pole pieces will hold the armature even if only the edge of the latter touches one core. The failure of the ringing current to go absolutely down to zero is another source of armature-sticking.

In the "non-freezing" ringer sticking is prevented by the use of non-magnetic pins on the armature. Two of these pins are placed at each end of the armature and project a small fraction of an inch over the top surface of the latter. They are placed so that each pair comes within the periphery of the bottom of the pole pieces. In this way a permanent air-gap is formed between the pole piece and armature that effectually prevents sticking. The use of two instead of one non-magnetic pin at each end of the armature has this decided advantage in that the armature with only one pin at each end may wobble just enough to permit one edge of the armature to touch the pole piece and freeze to it. This is not possible in the Western Electric "non-freezing" ringers.

The combination of the powerful three-bar No. 50 generator and the "non-freezing" ringer in the Western Electric No. 1317 Type "C" telephone represents a real step forward in the interests of better telephone service.

Municipal Plant Talked in Centralia

There is talk at Centralia, Wash., of constructing a municipal telephone system in Centralia, it being asserted that the local system can be duplicated for $35,000 and pay for itself in a few years. No definite action has been taken, however.

Railway Telegraph Superintendents Meet

Convention Report by Courtesy of Telegraph and Telephone Age

THE thirty-fifth annual convention of the Association of Railway Telegraph Superintendents was held at the Hotel St. Paul, St. Paul, Minn., June 20, 21, 22 and 23, with an attendance of 220 persons, including guests and members.

President E. C. Keenan welcomed the members and afterwards introduced Claude L. Matthews, who gave some facts regarding Jovianism. There are 15,000 Jovians in the United States, he said.

Prof. G. D. Shepardson, of the University of Minnesota, made an address in which he outlined the development of electricity from the earliest days. He said that the world gave Galvani credit for discovering electricity, but in reality it was his wife who was entitled to the honor. She was preparing a frog leg dinner when she noticed the twitching of a frog's leg when she used a steel knife.

Steinheil was the first to discover that the earth could be used as a portion of an electrical circuit.

He discussed the principles of modern methods of grounding.

At the conclusion of Prof. Shepardson's remarks Hon. V. R. Irwin, mayor of St. Paul, entered the room and in a few words welcomed the members and guests to St. Paul.

C. H. Wilson, general manager Long Distance Lines, American Telephone and Telegraph Company, New York, gave an interesting talk on the rapid progress in telephony during the past year. The recent test of wire and wireless telephony by the War and Navy departments, he said, were very satisfactory to the government. Wireless telephony for railroad work, he continued, was making great progress.

He announced that the American Telephone and Telegraph Company is building a wire line between Jacksonville and Key West, Fla., to connect with a wireless service with the various islands in the West Indies, and closed his remarks by expressing the regrets of Theodore N. Vail, president of the American Telephone and Telegraph Company, and Newcomb Carlton, president of the Western Union Telegraph Company, at their inability to be present. Both sent their kindest regards and best wishes for a successful meeting.

The following new members were then elected:

ACTIVE MEMBERS.

J. W. McCurdy, superintendent telegraph and telephone, Associated Pipe Line Company, San Francisco, Cal.; H. Hulatt, manager telegraphs, Grand Trunk Railway System, Montreal, Que.; C. W. Fraher, supervisor construction and maintenance, Chicago, Burlington & Quincy Railroad, Chicago; W. H. Flann, superintendent of telegraph, Northern Pipe Line Company, Oil City, Pa.; Hilliard C. McConkey, superintendent railway telegraph and maintenance, Canadian Northern Railway, Winnipeg, Man.; C. O. Van der Vort, engineer telegraph department, Michigan Central Railroad, Detroit, Mich.; J. E. Drewry, telegraph inspector, Illinois Central Railroad, Memphis, Tenn.; W. J. Williams, superintendent of telegraph, St. Louis and Southwestern Railroad, Tyler, Tex.; Claude Mitchell, acting superintendent telegraph, Gulf Coast Line, Houston, Tex.; D. L. Howard, superintendent telegraph, Canadian Pacific Railway, Calgary, Alb.; W. T. Davis, superintendent telegraph, El Paso and Southwestern Railway, El Paso, Tex.

ASSOCIATE MEMBERS.

George H. Groce, railway department, Electric Storage Battery Company, Chicago; W. H. Fenley, sales engineer, Kerite Insulated Wire and Cable Company, Chicago; W. C. Titley, division plant superintendent, Western Union Telegraph Company, Denver, Col.; J. E. Dempsey, Dempsey telegraphic code, Chicago.

C. H. Gaunt, general manager, Western Division, Western Union Telegraph Company, Chicago, was elected an honorary member.

The reports of the president and secretary-treasurer were then read. President Keenan reviewed the work of the association during the past year, and commended the chairmen and members of the various committees for their work.

Secretary P. W. Drew reported an increase of 26 members for the year, making a total membership of 210. As treasurer Mr. Drew showed the association's finances to be in a satisfactory condition.

The committee on resolutions reported on the deaths of Belvidere Brooks, S. A. D. Forristall and G. L. Lang, and a suitable memorial was placed upon the minutes.

At the afternoon session G. A. Cellar, chairman of special committee No. 1, on "Construction and Maintenance—Outside Plant," read the report of that committee, and a lengthy discussion ensued.

President Keenan stated that pole line construction was an important question with the members. He thought that separate specifications should be prepared for different sections of the country.

The loading of the lines by sleet received much attention in the discussion. P. W. Drew spoke of the ability of iron wires to stand up in sleet storms as against copper. George A. Cellar endorsed Mr. Drew's remarks with regard to the superiority of iron wires to stand up under heavy loads.

William Marshall, assistant manager telegraphs, Western Lines, Canadian Pacific Railway, Winnipeg, Man., favored shorter poles and longer cross arms.

C. A. Parker, of the Denver and Salt Lake, told of the difficulties experienced on his road in keeping up the lines, and pointed out that when strong poles are used the wires are more liable to break.

C. E. Keenan thought that regional specifications should be prepared to fit conditions.

The discussion was participated in by Messrs. W. P. Cline, W. F. Williams, C. S. Rhoads, E. A. Chenery and many others.

At Wednesday's session the report of special committee No. 2, on "Construction and Maintenance—Inside Plant," was read by Chairman M. H. Clapp.

CONSTRUCTION AND MAINTENANCE OF INSIDE PLANT.

The Committee on the Construction and Maintenance of Inside Plant stated that there is a great variation in the standards and practices being followed by the different railroads in the installation and maintenance of telephone and telegraph apparatus. In general, each railroad is installing and maintaining its equipment according to its own instructions and there is a decided lack of uniformity in specifications and standards that have been adopted by the different railroads. For obvious economical reasons, it is considered by the committee very desirable to adopt approved and uniform practices as far as practicable in connection with at least the commoner forms of telephone and telegraph equipment to be installed, operated and maintained. In order to carry out this plan, it is thought desirable for the association to issue as recommended practice standard plans, specifications, instructions and routines for use in installing, operating, maintaining and inspecting telephone and telegraph apparatus and materials.

In order to make a start in carrying out the general plan recommended, the committee suggested two specifications or instructions for consideration this year.

1st. General specifications for location and wiring of equipment.

2nd. Maintenance instructions to section linemen, telephone inspectors, users of the telephone and telegraph, including operators, wire chiefs, and managers in connection with inside plant.

These two suggested specifications were included in the report as exhibits C and D. In exhibit C there is a particularly good reference to ground wires.

This report was discussed in detail and was amended in many of its provisions.

In discussing the section of this report relating to batteries Archibald Wray, assistant superintendent, Chicago, Rock Island & Pacific, described and illustrated on the black board a new machine current battery of his invention for general use, of the direct and alternating current types, which, he said, has given satisfactory results. It does away entirely with the use of dry batteries. A great deal of interest was manifested in Mr. Wray's description and operation of the invention. The report of the committee was accepted as a progress report.

The next paper read was the report of special committee No. 3, by E. A. Chenery, chairman. This report was on the subject "Wire Chief Equipment and Routine." An abstract follows:

WIRE CHIEF EQUIPMENT AND ROUTINE.

Special committee No. 3 reported on specifications covering wire chief equipment and routine in railroad offices. These specifications are intended to cover in a general way recommended practices as to the equipment to be used and the routine to be followed in wire chief offices on railroads.

In laying out offices and providing equipment, every con-

sideration should be given to the prospects for future growth and to the prospects for the conversion of telegraph systems into telephone systems.

The equipment for offices of various classes is briefly described.

In the matter of office layouts the report says that inasmuch as wire chiefs will be, as a rule, required to perform other duties, including the supervision of repeaters and multiplex apparatus, and, in some cases, telegraphing, it is essential that the office be compactly arranged so that a minimum amount of time and effort will be required of the wire chief in going from one task to another. Local conditions will generally govern the exact manner in which a wire chief office shall be laid out. Some general recommendations are made, and these are followed by instructions for the testing of telegraph and telephone wires. Master selector or signaling office equipment, and phantom and composited circuits are also discussed.

In the discussion many members described the practice followed on their roads, and the report was amended in many of its details and finally adopted as the practice of the association.

Committee No. 4 submitted its report on "Protection Against Electrolysis" through Chairman William Bennett.

PROTECTION AGAINST ELECTROLYSIS.

Committee No. 4 on Protection Against Electrolysis submitted a statement of what has been done up to the present time in the matter of protection against electrolysis. The report covered preventive or mitigating methods in general; causes and effects of electrolysis; necessity of making an electrolytic survey immediately after cables are placed underground and at periodical intervals thereafter; methods of making preliminary and final surveys; difference of potential between points on the cable system and the adjacent earth deductions to be made from the surveys; instruments necessary for making surveys; importance of careful installation fo conduit and cable; methods of bonding, and the advisability of making graphic records. The experiences of various members are described, and illustrations of voltage testing rods are shown.

In the discussion of this subject Prof. G. D. Shepardson made some general remarks on the subject and described the most modern methods of dealing with the problem. He thought it was a matter that the association could very profitably consider. The report was accepted.

Chairman J. F. Caskey of committee No. 5 read the report of that committee on the subject of "Protection Against Lightning and High Tension Circuits."

The discussion developed many interesting facts in the practice of some of the members. I. F. Forshee, W. Rogers, W. B. Wyrick, A. Wray, M. H. Clapp and others outlined the methods employed on their respective lines, and W. C. Titley of the Western Union Telegraph Company made a few remarks on the subject. The report was accepted as a progress report.

C. S. Rhoads read the report of committee No. 6, on "Telephone Development."

TELEPHONE DEVELOPMENT.

The report of the special committee No. 6, on Telephone Development, starts with a history of the use of the telephone on railroads.

The use of the telephone for train dispatching, the report states, affords opportunities for the most efficient operation in that a larger volume of traffic can be handled with no increased dispatching force. This has been demonstrated on many lines during winter months or heavy traffic periods when additional train dispatching districts had to be created for no other reason than that the Morse circuits could not carry the load.

There seems to be practically no limit to the capacity of the telephone in this work, for which there are several reasons.

1st. The efficiency of the operators has been greatly increased. Experience has shown that only a small per cent have any trouble whatever receiving or transmitting orders and messages with the telephone, while on the other hand many were poor Morse operators.

2nd. The loss of time of calling offices has been practically eliminated. While this may not seem to be of great importance, yet close estimates show that at least one-sixth of the day was lost in this manner.

3rd. Siding telephones located in booths and pole boxes can be freely distributed along the division, thus giving employes access to dispatcher without going to stations, which facilitates handling of trains and eliminates loss of time.

4th. Portable sets are supplied to the crews of passenger, freight, wreck and work trains. These put the crews in immediate touch with the dispatcher from any point along the line.

Unquestionably further improvements will be made in present types of apparatus and new types of apparatus will undoubtedly be developed to replace present types in order to provide in a more efficient and economical manner the same classes of service that are now being given.

Owing to the great destruction of open wire plants by storm, particularly during the winter months, and the resulting prostration of the service, it is believed that aerial and underground cable will be used to a much greater extent in the future.

The development of the printing telegraph has already reached the stage where there is no longer a question of its commercial value, and as the possibilities in connection with the use of this equipment are more fully realized, its application will be extended to various branches of the service and, in all probability, a great deal of the railroad business, which is now carried on between division headquarters and widely separated centers by mail, will be handled with the printing telegraph. This will unquestionably result in very greatly increasing the efficiency of the branches of the service making use of this equipment.

What has been done in selectively controlled signals, it is felt, is only a mere beginning and it is believed that the future will bring forth a wide application of telephones and selectors to signal operation.

While for everyday operation of the train, message, private branch exchange and other branches of the railway telephone service it is felt that the wire system will continue to be the most important means of communication, there will undoubtedly develop a use for wireless telephone and telegraph service, which will be of material advantage in conducting the business of a railroad system.

In summarizing its report the committee states that it is felt that the telephone will be used exclusively for all short line work and that the telegraph will be used only between division headquarters and widely separated points and that, further, in this latter service the printing telegraph will largely replace the manual telegraph of today.

The discussion was general and the report was accepted as a progress report.

The meeting then went into executive session, which concluded the days' work.

THURSDAY'S SESSION.

The report of committee No. 7 on "Railroad Message Traffic" was head by M. B. Overly.

RAILROAD MESSAGE TRAFFIC.

The Committee on Railroad Message Traffic reported on the use of quadruplexes, duplexes, etc., to handle message traffic by Morse; handling messages by telephone; handling messages by printers; and coding, censorship, etc.

Quadruplexes and duplexes were reported on by M. B. Overly.

Whether it is advisable or practicable for any railroad to use any or all of the various types of multiplex telegraph apparatus, he said, will depend upon the volume of business to be handled, the size of railroad, and the number and kind of wires available. Its usefulness will depend largely on how thoroughly familiar the wire chiefs or other attendants are with this kind of equipment.

He then described at some length the methods and practice on his line, the Big Four, in regard to the use of the quadruplex and duplex.

W. L. Connelly reported on the handling of messages by telephone.

It is generally admitted, he says, that telephone message circuits are a very useful facility in the progress of telephone operation on railroads for the handling of messages; also as an auxiliary circuit when dispatchers' telephone circuit is in trouble, and most roads are endeavoring to obtain telephone message circuits after they have been equipped with dispatchers' telephone circuits. It is the concensus of opinion of those in charge on roads having telephone message circuits that they are an advantage as compared with Morse as follows:

Telegraphers not required; direct communication obtained, thereby greatly reducing the number of messages; calls answered more promptly, and greatly speeding up the service.

Information on the subject of handling messages of printer was given in tabulated form.

Regarding censorship, coding, etc., W. H. Hall and W. H. Potter reported that eight questions were sent to active members. Out of fifty-one replies received nineteen are of the opinion that more time is lost in coding and decoding than is gained on wires, three of these excepting coded phrases used many times each day, and day after day, and one limiting such code to fifty phrases and sentences.

It is the general opinion that large codes are expensive, much more time being lost in coding and decoding than is gained.

It is the opinion of several that with a small code persons using soon become familiar with code words and no time is lost in coding and decoding, one suggesting that code words be sug-

gestive, as an aid to memory. The opinion is expressed that it does not take longer to code and decode than to write out in full.

Eighteen roads are of the opinion that small codes are practical and effect a saving in money, two of these limiting such benefit to large roads only.

Different roads class small codes as containing from twenty-five to five hundred words.

One road has found that where telegrams are relayed once or more, time saving on the wires over-balances time lost in coding and decoding, but where sent direct coding does not pay, and thinks conditions should govern use of codes.

Opinion expressed by three roads is that codes are advisable where wires are over-crowded and use of code will avoid additional facilities.

One railway's experience has been that codes seem to make but little difference in telegraph work with clear and legible copies, while poorly written code words are an abomination, causing delays and errors.

Eight roads concur in the opinion that codes reduce the speed of service and cause more or less errors.

It has been the experience of one railway that codes cause delay to important telegrams, on account of persons handling being unaware of their importance.

One road has found a large code to be impractical and that a small code will not cover.

It has also been the experience that codes are not used when they should be, and when used are often improperly used.

Fourteen roads have found codes practical for purpose of privacy or secrecy, and some believe secrecy is the only excuse for coding.

Four roads have found codes in commercial business to be a good plan from an economical standpoint.

In addition to the use of small codes, the committee recommends the use of symbol letter and file number on all telegrams, as referred to at length in paper printed in proceedings of the annual meeting held at Rochester, June, 1915.

In discussing the section of the paper relating to the use of duplexes and quadruplexes, W. J. Camp stated that there was a limit to the working of long lines through repeaters. He mentioned a test between Montreal and Vancouver and back. The signals coming back "petered out," he said. In one case the word "this" came back to the originating point minus the two first letters. On another occasion he tested the retardation on a thousand-mile line with one repeater in it. There was a retardation of one-half second. Four repeaters are employed on the Montreal-Vancouver line.

W. Rogers of St. Louis pointed out the value of the polar duplex in wet weather compared with single line operation.

Referring to telephone message circuits E. C. Keenan stated that such circuits were a success in handling car reports, and that they were twice as good as the telegraph. Printers are successful, he said, where there is a load.

J. O. Carr, of the Korkrum Company, Chicago, said there was no question in regard to the ability of printers to work on railroad wires. It is merely a question of whether printer operation on a particular circuit will show a saving over Morse operation. From figures obtained from the Chicago, Burlington and Quincy and the Southern Pacific railroads on circuits which handle about 900 messages per day, a very considerable saving is shown, in one case amounting to about 35 per cent. However, as a volume of business on a given circuit decreases, the rental factor, which must be added to the cost per message, is relatively greater, and from data already obtained it would not seem to be economical to operate printers on circuits where the load is much less than 500 or 600 messages per day.

Mr. Camp stated that there were fewer errors made on the printer than were made by first-class operators.

The part of the report relating to codes was geneally discussed. J. E. Dempsey described his code and its uses. It is a five-letter code.

Wm. Bennett spoke favorably of the Dempsey code, which is used on his road, the Chicago and Northwestern.

G. W. Jett, of the Norfolk & Western Railroad, explained his code, which has been in use on his road for the past eighteen months. He uses letters for figures in representing car numbers, etc., and in writing car initials he forms one word by giving the letters of the initials of the words of the names of the railroads. His code is of the five letter type. The report was accepted.

The report of committee No. 8 on the "Full Use of Wdres," was read and accepted as a progress report. There was no discussion.

"Wireless Telegraph and Telephone Development" was the topic of the report of committee No. 9.

WIRELESS TELEGRAPH AND TELEPHONE DEVELOPMENT.

After reviewing the development of wireless telegraphy in trans-Atlantic work the report states that it was not until November 24, 1913, that wireless telegraphy was introduced in railroad operation. This was on the Lackawanna Railroad.

The wireless telegraph, the report continues, serves as an auxiliary means of communication, in the event of interruption to wire facilities. There is hardly a railroad in this country which has escaped an entire loss of wire communication on some parts of its line during the past year and during such interruptions almost any amount would be cheerfully expended if some means of communication could be found to ascertain the whereabouts of trains and the conditions existing at points entirely cut off from service.

It is not necessary for each railroad to install towers and wireless equipment along its entire line, especially in territories where one or more roads parallel one another. The different railroads, with terminals in the same city, can erect an efficient station and jointly share the expense of operating it. A few such stations at the more important terminals, operated in this way, would soon convince them of the merits of the system and each railroad could then expand, erecting additional stations along its individual lines, as the service might require.

Referring to wireless telephony the report says the accomplishments of the last year have merely demonstrated the principles and possibilities. At the present moment there is not a wireless telephone on the market capable of giving as satisfactory service as the wireless telegraph.

Wireless telephony, when perfected, will be more applicable to moving trains, especially as it will then not be necessary to employ a special man on trains equipped with the wireless system.

A letter from J. J. Carty, chief engineer of the American Telephone and Telegraph Company, New York, was read. Mr. Carty stated that in view of the long distance telephone tests made last year and this, it was shown that there is no limitation to the distances over which wireless telephony is possible. There is no difficulty in handling any required amount of power, nor is there any difficulty in obtaining any required sensitiveness at the receiving end. The wireless telephone, however, in common with the wireless telegraph, still presents a numbr of problems which have been only partially worked out. He referred particularly to the interference of wireless messages on each other and to the interference from atmospheric disturbances generally known as static, and to the lack of secrecy in wireless messages. At the present time, however, they form very rigid limitations to the use of wireless. There are inherent reasons, he said, why we must expect wireless to always be limited in its application as compared to wire working. It has been amply demonstrated that we must not look to wireless to replace the wire plant, but to extend and supplement it. Regarding the use of wireless telephone or telegraph for railroad purposes, Mr. Carty said it seemed to him that the requirements and conditions of railroad service are not sufficiently different from the requirements and conditions the telephone company has to meet in its important toll service to expect that different conclusions in the two cases should be reached regarding the use of wireless. Whether the value of a wireless installation as an emergency facility justifies at the present time the expense is a question for the railway officials.

Prof. Charles A. Culver, of Beloit College, Beloit, Wis., gave a summary of experiments carried out over the Lackawanna Railroad, which showed that it is possible to put any way station in wireless communication with moving trains without the employment of aerial wires at the fixed station. Standard radio equipment was used in these tests. The speaker also outlined other recent progress in the art, particularly the present tendency to use continuous waves as generated by oscillating arcs. The simplicity of the arc systems was illustrated by an actual transmitter of this type.

Philip E. Edelman, of St. Paul, stated that what railroads want was a practical system, cheap, serviceable and requiring no skilled operators. He represented a system of wireless telegraph or wireless telephone which, he said, was practical in railroad work for any distance up to 500 miles. He also proposed a combined wireless telegraph and wireless telephone costing little initially, with low operating expense.

J. J. Ghegan, of New York, stated that he had a wireless receiving set in his house with no antenna whatever on which he received signals from stations between and including Boston and Key West. This is the day of efficiency in wireless, he said, and the time was coming when we would be able to carry a wireless outfit in the pocket.

I. C. Forshee, of the Pennsylvania Railroad, Philadelphia, stated that the recent experiments of the American Telephone and Telegraph Company with wireless combined with wire telephone have opened up new fields which will make possible the application of wireless telephony to train operation in later developments. An installation to be of value for emergency

purposes should be dependable under all weather conditions and at any time of day for 365 days a year.

Washington, D. C., was selected as the place for the next annual convention, and September 18, 19 and 20 as the dates.

The election of officers resulted as follows:

President, M. H. Clapp; first vice-president, J. F. Caskey; second vice-president, F. T. Wilbur; secretary-treasurer, P. W. Drew.

Immediately after his election Mr. Drew stated that owing to the heavy demands upon his time by his regular work and that of the association he felt compelled to tender his resignation. His resignation was accepted with many expressions of regret, but was afterward modified so that he should hold the office of secretary-treasurer until a successor was appointed by the president. Mr. Drew has held the office for thirty-three years.

W. L. Connelly, superintendent of telegraph, New York Central Lines, Gibson, Indiana, was appointed secretary of the association.

W. P. Cline was elected chairman of the Eastern Division, and L. M. Jones chairman of the Western Division.

Resolutions of thanks were passed for the favors extended by the Railway Telegraph and Telephone Appliance Association, the Hotel St. Paul, the American Telephone and Telegraph Company, the Northwestern Telephone Exchange Company and the Western Union Telegraph Company.

After an expression of thanks by Mr. Keenan to the members and officers for their support during the past year, the convention adjourned.

ENTERTAINMENT.

The entertainment of the party, especially the ladies, was liberal and well planned.

At 8 p. m. Monday, June 19, there was an informal reception at the Hotel St. Paul.

Tuesday, June 20, the ladies were given a luncheon and an afternoon theatre party and later all hands were entertained at dinner at Wildwood.

Wednesday, June 21, the time of the ladies was filled with a luncheon at the Minnesota Club and a sight-seeing automobile ride. In the evening there was a banquet at the Hotel St. Paul in which the entire party participated. The menu was a specially fine one, and an orchestra rendered some excellent music. After the dinner addresses were made by E. C. Keenan, E. P. Griffith, Prof. G. D. Shepardson, W. E. Hall, Mrs. Wm. Bennett, W. J. Camp, A. D. Walters, B. A. Kaiser, M. B. Wyrick, J. J. Ghegan, G. A. Cellar and Wm. Bennett, and after the singing of "America" the party disbanded.

A luncheon on the roof garden of the hotel and shopping trip occupied the time of the ladies Thursday, June 22.

On Friday the entire party went by trolley to Minnetonka Beach and took a steamer ride on the lakes. Dinner was served at the Hotel del Otero. The weather was bright and cool and a very enjoyable time was had.

All the entertainment was given by the courtesy of the Railway Telegraph and Telephone Appliance Association and those in charge deserve much credit for the excellent manner in which the entertainment was planned and carired out.

NOTES AND EXHIBITS.

The Automatic Electric Company, Chicago, was represented by J. H. Finley. A Fuller block storage battery and a Jester Cooper repeater were shown.

The Electric Storage Battery Company, Philadelphia, Pa., distributed a pamphlet on the use of the storage battery in selector service for telephone train dispatching. G. H. Groce represented the company.

J. H. Bunnell & Co., Inc., New York, exhibited samples of "The Supreme Key;" the "M C M" main line sounder; the Ghegan "Kick-off" and line discharger and several cells of the Jove dry battery. The "Kick-off" provides means for preserving communication with and between way stations on leaky lines. The "M C M" main line sounder does away with the use of local batteries. The company was represented by J. J. Ghegan, president, and C. E. Graham, treasurer.

Among the companies represented at the convention were the Morkrum Company, by J. O. Carr; the Electric Storage Battery Company, by G. H. Groce; the American Telephone and Telegraph Company, by C. H. Wilson and W. E. Bell; Automatic Electric Company, by J. H. Finley; the Western Union Telegraph Company, by J. C. Hubbard, E. Parsons, W. W. Watt, W. S. Wood, M. B. Wyrick, W. C. Titley, R. W. Kean, M. L. Lane, A. Young and J. J. Monzingo; Thomas A. Edison, Inc., by F. J. Lepreau; Western Electric Company, by G. K. Heyer, J. C. Field, J. B. Harlow, J. C. Binning, A. L. Frankenberger; J. H. Bunnell & Co., Inc., by J. J. Ghegan and C. E. Graham; Kerite Insulated Wire and Cable Company by W. H. Fenley and G. A. Graber. Other interests were also represented.

Lima, Ohio, Wants Vote on Ownership

A petition under the initiative and referendum laws, calling for a vote on a proposed ordinance drafted to make the Lima Telephone and Telegraph Company a municipal possession, is to be circulated in the city of Lima, Ohio, according to official notice formally served on City Auditor David L. Rupert.

If ten per cent of the voters of Lima sign the petition, there will be a special ballot for the November election which will decide whether or not the city shall purchase, condemn, or otherwise acquire the local telephone system. If the petition should gain the required number of signers, about 700, and subsequently be passed in November, the city authorities would be authorized to get the telephone plant—the method not being specified in the ordinance—and issue bonds to pay for it, the bonds to be secured by a franchise subject to forfeit to the bondholders in case the municipal management should fail.

Former Safety Director Edwin Blank, Scott Wilkins, E. O. McPherron, S. L. Neuman and E. B. Lewis are the affiants signing the declaration, declaring such steps necessary and stating the ordinance for which the petitions are to be circulated. Miner A. Atmur is the notary before whom the signers appeared for swearing. Briefly summarized, the contents of the ordinance as outlined in the declaration of intentions are as follows:

1. Acquisition of Lima telephone system declared necessary.

2. Council and mayor authorized to obtain the plant and rights, franchises, claims, etc., "by condemnation or otherwise."

3. Payment to be made to owners from money to be secured by issuance of mortgage bonds, which in turn is to be secured by a franchise granted by the council.

4. Council, city officials and others who may have authority enjoined from preventing formation of union or similar association among employes of municipal telephone company.

Interesting Industrial Welfare Activities

The August number of *The Modern Hospital,* a magazine published from St. Louis and Chicago, is devoted to a symposium on welfare work among the industrial corporations of the country. There are editorials by those competent to write on this important subject, a great number of papers written by welfare directors in some of the most important industrial corporations, and an immense amount of statistics and figures and facts showing the huge volume of work that the corporations are doing in the interest of the welfare of their employees. The journal contains many illustrations of welfare features in corporation plants, and many facts that should be of great help to those interested. Among the topics discussed are those of first aid, industrial nursing, lunches and diets for industrial employees, safety devices in factories. and athletic and social clubs for employees. The editors frankly state that they have been unable to obtain figures as to cost of welfare work in the industries, but a number of writers attempt to make deductions and draw conclusions from their experiences of the past few years.

The Modern Hospital divides welfare work into three phases:

1. To make employees healthy, comfortable, and happy, in order that they may achieve the highest efficiency in their work.

2. To help employees prepare for the day when they are prevented from being bread winners, so that

dependents on them may be provided for in case of sickness or disability.

3. To provide entertainment, recreation, and interesting groupings, in order that the employees of the corporation may have mutual interests which will enhance their loyalty and team-work.

Court Upholds Nebraska Commission

The Nebraska State Railway Commission is sustained in the suit brought by Victor Wilson in behalf of a subscriber of the Polk County Telephone Company against the company. The suit attacked the right of the State Railway Commission to make rates different from those provided in the franchise.

The Supreme court holds that unless expressly authorized and empowered by the legislature so to do, a municipal corporation has "no power by contract to deprive the state of the right of regulation of rates of a public service corporation."

The syllabus:

Unless expressly authorized and empowered by the legislature so to do, a municipal corporation has no power by contract to deprive the state of the right of regulation of rates of a public service corporation.

A contract or agreement made in a franchise ordinance by which the maximum rates to be charged by a telephone company for the use of telephones by the inhabitants of the city is made subject to the right of regulation.

Since the adoption of the constitutional amendment creating the State Railway commission and the passage of the law specifying the duties of said commission, that body has power to regulate the rates charged for the use of telephones in cities of the second class.

The statute provides that in appeals from the decision of the Railway commission in the matter of rates or charges, such a decision is prima facie evidence that the rates fixed are just and reasonable, and such rates shall remain until annulled, modified or revised by the commission, or until finally adjudged to be unreasonable and unjust in a court of competent jurisdiction. Sections 6128 and 6139, revised statutes.

Evidence examined, and held that the rate of $2.50 per month allowed by the State Railway commission to be charged for the use of telephones for business purposes in the city of Stromsburg has not been shown to be unreasonable and unjust.

Prosperity in Fort Dodge

In the last six months 680 new telephones have been installed in the city of Fort Dodge, Ia., according to J. M. Plaister, manager of the Fort Dodge Telephone Company. It was six months ago that the controversy between the city and the telephone company was settled.

This marvelous growth in business is without parallel in the history of the company. It is partly due, of course, to the fact that for some time previous to the settlement no telephones were installed.

The company is now in a position to install telephones in practically any section of the city, according to Mr Plaister. Because of lack of certain equipment, there has been some difficulty in a small district in the northeastern part of the city and on Round Prairie.

"This equipment has now arrived," said Mr. Plaister. "As soon as it is placed we will be able to put in telephones anywhere in the city."

Interference Issue Up to Court

Do the telephone lines have exclusive rights on the highways? The Iowa State Railroad Commission has heard arguments to decide this question. Attorneys for telephone companies contended that the state should not grant franchises to electric lines where such lines would be constructed along thoroughfares where telephone lines already are in operation.

Attorneys for the transmission lines contended that the telephone companies do not have exclusive rights. They declared that if the electric current from the transmission lines renders the grounded telephone lines useless, that the telephone companies at their own expense must make the telephone lines metallic circuit so that the electric current will not interfere with service.

J. C. Hume, J. L. Parrish of Des Moines and John A. Reed of Cedar Rapids represented the transmission lines. Harold Beyer of Grinnell represented the Independent Telephone Association of Iowa and H. W. Byers of Des Moines represented 500 rural telephone companies.

A. T. & T. Earnings for Six Months

Total earnings of $25,184,030.08 are shown by the six months statement of the American Telephone and Telegraph Company. The statement covers the six months ending June 30. Earnings for the same period last year were only $23,149,807.40. Expenses were $2,725,155.38, against $2,707,178.52 last year. Net earnings were $22,458,874.70, compared with $20,442,628.88 last year. Dividends of $15,425,007.88, compared with $14,250,361.64 last year, were paid.

The Bell System reported total operating revenues for May of $21,746,353, an increase of $2,379,594 over last year, and revenues for five months ending May 31 of $105,300,128, an increase of $10,736,658 over last year. Net operating revenues in May were $7,287,221, an increase of $832,532, and in the first five months of the year they were $36,355,911, an increase of $4,373,116. Surplus earnings in May were $1,836,660, a gain of $654,275, and in the five months they were $9,085,145, an increase of $3,453,739.

Forbidden to Quit

A controversy between Manager C. F. Nickel of the Hughson Telephone Company, and four patrons of his exchange has been decided by the California Commission.

Patrons of the Hughson exchange received printed notice through the mail in the morning that service would be discontinued at midnight, the cause given being the fact that the Railroad Commission had ordered restoration of service to four patrons whom he had disconnected by reason of a controversy over the rates they should pay.

The 209 patrons of the exchange were startled. The officials of the Pacific Telephone & Telegraph Company at Modesto were aroused, because discontinuance of the Hughson exchange would affect their toll service. The four contending patrons also got busy with the Railroad Commission.

The final activity was a telephone communication between Manager Nickel and a member of the commission, and Nickel decided to continue operation of the exchange.

The difficulty between the patrons and Manager Nickel will now be subject to a hearing and adjustment.

Don't be afraid to work a little overtime if your work piles up; and never let your work pile up so you have to work overtime.

Brevities of the Business

The Activities of the Whole Telephone Field Told in Short Paragraphs

PERSONAL NOTES.

J. J. Hartman, plant chief of the Diamond State Telephone Company, Dover, Delaware, has been promoted to the position of chief plant inspector with headquarters at Wilmington. Mr. Hartman is succeeded by A. H. Wilson of Wilmington.

I. E. Sprankle, of Lancaster, has taken up his duties as manager of the exchange at Youngstown, Ohio, for the Bell Telephone Company. W. E. Putnam of Ironton will be manager at Lancaster.

W. C. Moore, of Cookeville, district superintendent of Tennessee, has been transferred to Glasgow, Ky., as manager of the Glasgow Telephone Company, a new organization consolidating all of the telephone interests in that section, and is succeeded by E. C. Warner, district wire chief. J. T. Weaver, assistant wire chief, succeeds Mr. Warner.

Frank Lease, of Dixon, Illinois, has accepted a position with the Carroll County Telephone Company.

S. C. Poage has been made manager of the Arkansas headquarters of the Southwestern Telegraph and Telephone Company, which was recently transferred from St. Louis.

Blaine G. Zinn, representative of the Tri-State Telephone Company at Uniontown, Pa., has resigned and is succeeded by William Hoke.

E. I. Stafford has been transferred from the Wichita office of the Bell Telephone Company to Hutchinson, Kansas, where he will succeed A. G. Clapp, acting wire chief, who has been transferred to the Western Electric Company.

Charles F. Kouba has resigned his position as commercial manager of the Rochester Telephone Company at Rochester, Minn., to accept a more lucrative one with the Nebraska Telephone Company at Omaha.

H. J. Eads of Wahoo has succeeded H. Lee Marshall as manager of the telephone exchange at Weeping Water, Neb.

D. E. Myers, manager of the Spartanburg exchange of the Southern Bell Telephone Company, has been made district manager and transferred to Darlington, S. C. Mr. Myers is succeeded by H. D. Gurley of Charlotte.

J. R. Mariet, of St. Paul, has been made manager of the Rochester exchange of the Rochester Telephone Company, Minnesota, succeeding Charles F. Kouba.

Thomas Crouch, district manager for the Southern Bell Telephone Company at Darlington, S. C., has been transferred to Raleigh, N. C., as district manager, succeeding W. A. Jennings, resigned.

Hawes B. Judy, who has been connected with the traffic department of the Chicago Telephone Company, has resigned to take a position in Detroit as district traffic chief under J. W. Bradshaw, traffic superintendent.

ALABAMA.

Heavy damage was suffered by the Southern Bell Telephone Company's service in the recent storms and heavy rains. In Mobile the service had to be suspended for a brief period and over 1,200 telephones were put out of commission, 680 poles and six miles of cables were blown down. Nearly 1,200 phones were reported out in Montgomery, while Birmingham was the hardest hit with 1,300 out of commission.

ARKANSAS.

The Home Telephone Company, Ozark, has moved into new quarters in the Masonic Temple. A new switchboard was installed.

The Southwestern Telephone and Telegraph Company will build a copper metallic telephone line along the Yellville, Rush and Mineral Belt railroad to the Rush mining camp. Work will start at once.

The new long distance telephone line from Gravette to Vinita, Okla., is completed.

General headquarters of the Southwestern Telegraph and Telephone Company for Arkansas will, beginning July 1, be in Little Rock instead of St. Louis, according to the announcement made by Ben S. Read, second vice-president of the company. S. C. Poage has been appointed general manager for Arkansas, S. A. Lane, general commercial superintendent, and L. M. Loring, general traffic superintendent.

The Bearden Telephone Company has been sold to the Home Telephone Company of Fordyce.

CALIFORNIA.

Improvements amounting to $30,000 are being made by the Bell telephone system in Long Beach.

At the meeting of the Petaluma Rural Telephone Company held July 5, the following officers were elected: President, D. M. Winans; vice-president, J. R. Denman; secretary, George Gaston; treasurer, F. H. Denman.

Expenditure of $6,000 in the Hillcrest district and in Ocean Beach is being made by the Pacific Telephone & Telegraph Company, according to Manager J. E. Franklin of the San Diego office. This outlay covers the cost of pole line, aerial cable, aerial wire and underground cable construction and repairs.

CANADA.

The Bowersville Telephone Company, Limited, Bowersville, have obtained a charter.

COLORADO.

The Mountain States Telephone Company is improving its toll lines between Boulder and Denver.

FLORIDA.

Small damage resulted from a bolt of lightning which struck a corner of the Bell Telephone Company's building on West Adams street, Jacksonville, recently.

ILLINOIS.

The Bell Telephone Company is rebuilding its lines in South Pekin.

Pearl City Mutual Telephone Company, Pearl City; capital, $5,005. To buy and sell telegraph and telephone franchises, patent rights and letters patent. Incorporators—Edw. Tollmeier, Lewis H. Kuhlmyer, Lewis C. Housel, D. F. Thompson and J. G. Woker.

Murphysboro Telephone Company Employes' Association, Murphysboro; incorporators, Roy Gower, W. L. Ford, Elsie L. White.

The new South Chicago telephone exchange is well under way. It will be one of the most modern.

At a meeting of the stockholders of the Montgomery County Telephone and Telegraph Company the old directors were re-elected, and at a directors' meeting, held July 15, the following officers were elected: A. M. Howell, president; J. H. Ward, first vice-president; C. W. Bliss, second vice-president; E. C. Constans, secretary and treasurer, and J. M. Finley, superintendent of construction. A dividend of 1½ per cent on the new stock was declared.

The Western Telephone Company and the local telephone company, of Augusta, have been consolidated.

INDIANA.

A business meeting of the Cadwallader Telephone Company was held in West Lebanon July 10. New officers were chosen as follows: J. H. Brenner, of West Lebanon, president and manager; Ira Evans, of West Lebanon, secretary-treasurer. A new board of directors was chosen a few days ago as follows: C. L. Messner, Ira Evans, J. H. Brenner, A. J. Johnson and Frank Neville.

A deal was recently consummated whereby the Otterbein telephone system changed hands. Luther Perigo, wife and son, Frank, who have owned the exchange for four years, disposed of their holdings to Conarroe brothers, of Chattsworth, Ill., and Frankfort, Ind. The new owners took possession July 1.

IOWA.

The Oakville Telephone Company, Oakville, transferred to the Oak-Mutual Telephone Company all their property. The exchange is now operated by a mutual company.

The annual meeting of the stockholders of the Eastern Iowa Telephone Company was held July 19 in the company's central exchange building at Oxford. This is the first time the stockholders have met since the regular annual meeting in January, 1915, when an amendment was adopted to the articles of incorporation, changing the date of future meetings to July. The same directors were re-elected as follows: Fred H. Crow, L. M. Crow, F. B. Kimball, Chas. S. Crow, and Horace Kimball. Immediately following the adjournment of the stockholders' meeting, the board of directors re-elected the following officers: President and general counsel, F. B. Kimball; secretary and general manager, F. H. Crow; treasurer, Chas S. Crow.

The Duncan Telephone Company, Duncan, incorporated with a capital of $6,000. Incorporators, J. J. Frick, Frank Trica and Fred Reihm.

The Dougherty branch of the Farmers' Telephone Company of Rockwell have moved their exchange into the building first door north of the World office and will soon be prepared to give

first class service to all patrons on the line. Many improvements are being made.

KANSAS.

The formal transfer of the Washington Telephone Company from its former owner, H. O. Janicke, has been made to the new company composed of a number of Washington business men. Geo. H. Clasen is the manager.

The Bell Telephone Company is improving its system in Parson. The first work will be on the underground conduit which is to be laid on the east side of the city.

KENTUCKY.

The Rockland Telephone Company, Bowling Green, capital $1,000; incorporators: T. R. Hines, J. S. Justice and A. J. Stahl.

Glasgow Telephone Company, Glasgow, capital $100,000; incorporators: Basil Richardson, Dr. R. H. Porter and W. L. Porter.

Subscribers of the Maysville Telephone Company, Maysville, have received notice to the effect that beginning July 1, there would be a raise of $9 a year on business house phones and $6 on private residences.

MAINE.

The Pacific Telephone & Telegraph Company has opened a direct line to Clackamas range, where the Oregon National Guard is mobilized. The line is reached from Portland by calling "Clackamas Range," and not by asking for "Clackamas."

MICHIGAN.

The Michigan State Telephone Company employees held their annual picnic and field day at Bois Blank, July 22.

Farmers' Telephone Company, of Beavertown, $450.

MINNESOTA

The telephone line between Bigfork and East Bustitown is completed.

On June 28, the settlers of the Third River and Dixon Lake districts worked on the erection of the new telephone line. All settlers donated their services for the day and accomplished a great deal of the work needed to complete the line.

Incorporation articles were filed by the Mesaba Valley Telephone Association, which is organized to engage in the rural telephone business in St. Louis county. The capital stock is $1,000, divided into 100 shares at $10 each, and the incorporators are: W. F. Haenke, H. F. Kendall, Thomas P. Butler, Peter Jussila, Immanuel Niemisti and W. T. Kady, all of the town of Nichols, and Thomas Moe of the town of Clinton.

Incorporation papers have been filed by the Long Lake Cooperative Telephone Company, which will operate in Long Lake township. The capital stock is $1,000 and $50 is the highest indebtedness permitted. The incorporators are Peder Madsen, J. P. Jensen, H. M. Hughey, K. J. Nesheim, Gust Soderman, John Handeland, Emil Paulson, Oscar Thelander and Ludwig Larson.

MISSOURI.

The Bell Telephone Company will close its office in Jefferson City, August 1.

The new directory of the Missouri & Kansas Telephone Company in Springfield will be distributed August 1.

The Missouri and Kansas Telephone Company held their third annual picnic at Fairmount Park, Kansas City, July 17 and 18.

MONTANA.

Prevailing high prices of all building material and inability to secure certain necessary parts, are given as reasons for the decision of the Mountain States Telephone Company not to build a central exchange building in Roundup this year. District Manager Owens of Billings has signed a two-year's lease for offices in the second floor of the Pebbleford block and equipment and cables are now being put in place.

Articles of incorporation for the Farmers' Mutual Telephone Company of Laurel were filed with the county clerk and recorder. The company is capitalized at $40,000, of which amount $1,150 is paid in. The incorporators are A. G. Rich of Park City; J. M. Mott of Laurel, and T. R. Holmes of Laurel. The company announces intention to construct, own and operate telephone lines in Montana.

The Beaver Valley Telephone Company, Carlyle, $10,000. T. A. Morris, F. M. Hopper, and L. Preiner incorporators.

NEBRASKA.

The Lincoln Telephone and Telegraph Company has remitted to the city $604.04 as its occupation tax money for June.

NEW YORK.

The New York Telephone Company has started work on a new fireproof central office building at the southeast corner of Gates and Fairview avenues, Brooklyn, to house the "Evergreen" telephone exchange. The building will be completed in December and the new switchboard apparatus is expected to be installed and ready for use by May, 1917.

NORTH CAROLINA.

The Southern Bell Telephone Company in Winston will begin the construction of their underground system.

NORTH DAKOTA.

Telephone connection to St. Anthony, and rural lines connecting scores of farms will be realized within a very few weeks, according to F. L. Shuman of the Mandan Telephone Company. Mr. Shuman was present at the meeting and assisted in the organization of the St. Anthony Telephone Company. The officers are: President, E. R. Helbling; vice-president, Lorenz Geiss; secretary, F. M. Klein; treasurer, Adam Leingang. These four with Jos. J. Lantz, form the board of five directors. The stockholders have taken over the Mandan Telephone Company line to Strain, will make the two and a half mile extension from Strain to St. Anthony, and will run a large number of branch lines from St. Anthony in all directions.

More telephones will be added to the farmers' line running west of Underwood.

Arnegard will soon be supplied with a local telephone exchange.

E. Geissbarth and George Dickinson of Brinsmade are planning the construction of a telephone line to Tilden, work in digging holes for the poles having been started.

The Farmers' and Merchants' Telephone Company at Flaxton is building between thirty and forty miles of new line.

The annual convention of the telephone operators of North Dakota was held in Bismarck, July 13.

OHIO.

The Bell Telephone line between Elyria and Amherst is being dismantled. The Amherst Home Telephone Company has purchased the property of the Bell Company at Amherst and the line extending through Brownhelm. The Bell company will continue its service west of here through service by the way of Lorain and along the lake shore to Vermilion.

Cleveland Telephone Company reports May operating income $41,816; increase, $9,478.

Commercial Manager Norris has announced improvements in equipment and lines for the Central Union Telephone Company in Canton to amount to $125,000.

The Rockland Telephone Company, Bowling Green; capital, $1,000. Incorporators, T. R. Hines, J. S. Justice and A. J. Stahl.

The Sandusky Telephone Company has issued a new directory.

At a recent meeting of stockholders and directors of the Montgomery County Telephone Company, J. T. Barlow, president; H. C. Kiefaver, vice-president, and A. W. Surrell, secretary and treasurer, were re-elected. The Montgomery County Telephone Company owns exchanges in Miamisburg, West Carrollton, Centerville and Sulphur Grove and leases them to the Ohio State Telephone Company.

Glasgow Telephone Company, Glasgow; capital, $100,000. Incorporators, Basil Richardson, Dr. R. H. Porter and W. L. Porter.

It is rumored a new brick building will be erected in Girard by the telephone company.

A new switchboard is being installed by the Farmers' Telephone Company in Bloomville.

OKLAHOMA.

Goltry Independent Telephone Company, Goltry, capital, $2,500, incorporated by W. C. Nelson, C. F. Preston, C. E. Kisling and others.

OREGON.

The Pacific Telephone and Telegraph Company will construct fifty miles of new telephone line between Roseburg and Myrtle Point.

PENNSYLVANIA.

The Keystone Telephone Company, of Philadelphia, has declared a dividend of $1 (2 per cent) on the preferred stock, on account of accumulated dividends, payable August 1 to stock of record July 20. This leaves a balance of accumulated dividends on the preferred stock of $28.50.

John O. Beam, manager at Reading for the Bell Telephone Company of Pennsylvania, states that the company has approved an appropriation of $50,000 for additions and betterments to its plant.

The Johnstown Telephone Company will enlarge its building and install some new equipment.

The Bell Telephone Company will start work in a short time on a new toll line from New Castle to Elmwood City. The line is a toll cable line, and when completed, will cost the company $85,000.

Council passed an ordinance providing for the installation of a trunk line to be used exclusively for fire alarms from the Bell telephone exchange, Williamsport to the city hall.

Bell Telephone Exchange (Alterations and Additions), 406 Market Street—To F. W. Van Loon. Brick fire tower. For Bell Telephone Company. Cost, $13,000. John T. Windrim, architect. Permit granted.

The annual meeting of the stockholders of the Columbia Telephone Company was held July 19 in the office, when the following directors were elected: Mrs. Esther F. Young, Charles E. Taylor, Dr. S. S. Mann, C. E. Lenig, H. M. Hall, Samuel W. Hinkle and Charles L. Filbert. The board later organized by the election of the following officers: President, Mrs. Young; secretary and treasurer, Mr. Taylor; chairman of executive committee, Dr. Mann.

The Petroleum Telephone Company held its quarterly meeting at the home of R. G. Lamberton, near Sugar Creek, July 19. A new building was discussed.

SOUTH DAKOTA.

The Grotone Ferney Mutual Telephone Company has started alterations and improvements to its office.

TENNESSEE.

Improvements amounting to approximately $6,000 will be made in the switchboard equipment of the American Telephone & Telegraph Company in Memphis, according to district traffic chief. When the new switchboards are installed the services of 16 new operators will be required and the facilities of the local long distance office will be increased 30 per cent.

TEXAS.

H. C. Robibson, of San Antonio, has purchased the Caldwell and Giddings telephone exchanges.

China Springs Telephone Company, China Springs, capital, $2,232. Incorporated by T. N. Curtain, D. G. Stewart and Frank Walker.

All telephones were put out of commission by destruction of the Southwestern Telephone Company's plant in Austin.

WASHINGTON.

The Uniontown Telephone Company is placing cable on the poles on Main street and will shortly move into the new building.

The South Central Rural Telephone Company of Brighton Park, Thurston county, has been incorporated. The capitalization is fixed at $3,000 and the trustees are A. W. Jones and C. W. Clough, of Brighton Park, A. A. Nelson, of Plum Station, F. E. Littlejohn, of Independence, and C. A. Beese, of South Union.

WISCONSIN.

The Citizens' Telephone Company has purchased a plot of ground 120x90 feet on Center avenue, Sheboygan. A new telephone building will be erected on the site.

The new toll telephone lines between Stevens Point and Grand Rapids are completed, the total cost being $7,272.02. The work consumed about a month.

Members of the city street committee met with officials of the Wisconsin Telephone Company to consider the company's plan for the placement of telephone wires underground in the western part of Madison.

The Nasewaupee Telephone Company is building a private line to Cabot's Lodge, Hainesville.

The contract for the erection of the Brooklyn Telephone Company's building has been let to R. J. Story.

WYOMING.

Inspired by the prospects of the future growth of Wyoming, the Mountain States Telephone and Telegraph Company has initiated extensions and improvements to its service in the sparcely settled localities, which will cost in excess of $150,000. The largest single phase of the work will be the construction of a toll line from Casper to Lander and north to Thermopolis. This line will be extended from Thermopolis to Shoshone to take the place of the present line from Lost Cabin to Thermopolis. The latter line is to be temporarily abandoned for lack of patronage. A line running west from Casper to Thermopolis will tap the Thermopolis line.

Rules Chicago-Oak Park Rate Is Illegal

Justice of the Peace W. Stevens Lewis has handed down a decision that the 10-cent telephone rate between Chicago and Oak Park, Ill., was illegal. The action was brought by Attorney Myer J. Stein to recover $2.30 in tolls paid to the Chicago Telephone Company under protest. Stein's contention that a 10-cent rate between Oak Park and all parts of Chicago, except Austin, where a 5-cent rate obtains, constituted discrimination was upheld by the court. Attorneys for the Chicago Telephone Company will appeal the case.

U. S. I. T. A. Traffic Committee Meets

The Traffic Committee of the United States Independent Telephone Association held its last meeting at Columbus, Ohio, on July 10 and 11.

There were present: F. V. Newman, secretary-treasurer of the Michigan Independent Telephone and Traffic Association, Grand Rapids, Michigan; H. E. Davis, general traffic superintendent of the Kansas City Home Telephone Company, Kansas City, Mo.; T. J. Tune, traffic engineer of the Ohio State Telephone Company, Columbus, Ohio; Q. E. Elwell, traffic superintendent, Ohio State Telephone Company, Columbus, Ohio; W. I. Howard, superintendent of long distance, Tri-State Telephone & Telegraph Company, Merriam Park, St. Paul, Minn.; C. E. Doolittle, traffic superintendent of Citizens Independent Telephone Company, Terre Haute, Indiana; W. H. Hay, service engineer, Western Pennsylvania Independent Telephone Association, Pittsburgh, Penn.; J. A. Harrison, traffic engineer, Lima Telephone & Telegraph Company, Lima, Ohio; V. Eversole, traffic chief, Lima Telephone & Telegraph Company, Lima, Ohio; C. E. Smith, traffic manager of Citizens Telephone Company, Grand Rapids, Michigan; Martin Umbach, traffic manager of the Home Telephone & Telegraph Company of Fort Wayne, Indiana; G. R. Johnston, vice-president of the Ohio State Telephone Company, Columbus Ohio; W. S. Vivian, secretary-treasurer of United States Independent Telephone Association, Chicago, Illinois.

The sub-committee. which had been appointed at an earlier meeting, held in May, consisting of Messrs. Newman, Tune and Vivian, had met at Columbus on Saturday, where they had put in the day in further preparations of the rules. Sub-committee made its report when the meeting was called to order on Monday, of the progress made in the proposed operating instructions.

Following this report a good share of the time was put in in examining and discussing the proposed provisions. Mr. Elwell submitted a report on ticket operating, Mr. Davis a report on routing instructions, and Chairman Newman a series of questions. All of these reports were received by the committee and will later be placed in the proper place in the proposed book of operating instructions.

On Tuesday the visitors had an opportunity of witnessing the methods used by the Ohio State Telephone Company in its school, which was conducted by Miss May Marion.

Following the school, Chairman Newman gave a demonstration with his lantern, throwing quite a large number of slides on the screen.

Both the school and the demonstration were of great interest to the visitors.

Following this, the entire company adjourned to the offices of Messrs. Tune and Elwell, where an examination was made of numerous reports, maps, etc., that the Ohio State Telephone Company is using and preparing in its traffic department.

On Monday evening the visitors were the guests of the Ohio State Telephone Company at a dinner given at the Hartman hotel.

Before the meeting adjourned, the committee received an invitation from H. E. Davis to hold its next meeting in Kansas City. The invitation was accepted by the committee and the next meeting will be held in Kansas City, in all probability the early part of December. It is hoped that the new book of operating instructions will be ready for distribution some time during the early part of the fall.